OUTLINES

OF

ANALOGICAL PHILOSOPHY:

BEING

A PRIMARY VIEW

OF THE

PRINCIPLES, RELATIONS AND PURPOSES

OF

NATURE, SCIENCE, AND ART.

By GEORGE FIELD,

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"Τριχθὰ δὲ πάντα δέδασται."—Iliad, xv. 189.

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GENERAL INTRODUCTION.

EVERY work involves a design or subject,—a plan and execution: it has also a motive or inducement, which belongs less to the work itself than to its author; and for each of these he is accountable. With regard, therefore, to the Motive of the following attempt,—whether it may have been the vanity of establishing a new system, the meaner purpose of supplanting the many that have preceded it, or the better intention of reconciling their discordances,—or whether rather, wanting a nobler object, it may not have been that emulation of applause or profit which overcomes an author's dread of toil and disappointment,—may become questions, but are points of little moment, if the essay itself have but the merit of *truth*; for then it will not want interest, nor fail of a beneficial consequence.

Nevertheless, it may serve to indicate the design and subject of the work to state, that its earliest and constant incentive has been the desire

of answering the very natural inquiry of every thinking being,—what is the Universe in which he finds himself? From which spring, also, the questions,—what are his relations therein?—and what are the purposes of the whole? Such has been the motive to our attempt: the issue of which is to be regarded but as the endeavour of an individual to reply to these and their dependent inquiries, and to communicate his own satisfaction to others.

And with regard to the plan and execution of the work, it may be expedient that we offer somewhat by way of general introduction and apology.

Further, therefore, as to the plan adopted, it originated in an early attempt to methodize our philosophic studies so as to render them available to our design, for all subjects, upon a principle of intellectual economy, in the prosecution of which we were led to infer that we had struck upon the first principle and universal forms of nature, and to cast all our researches into system.

Of such system the work before us is a compendium, of which we promulgated the first lines upward of twenty years ago in a quarterly periodical of that day,* followed by other Outlines in continuation; our intention in resuming and republishing of which has been to restore the whole,

* The Pamphleteer, 1816.

in some measure, to its original systematic integrity, and to preserve the groundwork of a system, which we believe (fondly, perhaps) to contain the seed of a complete reconcilement throughout philosophy; which, merely germinating from our hand, may, under genial suns, be fostered to maturity.

The above-mentioned partial and dispersed publication, mis-associated in a periodical almost exclusively political, by depriving these Outlines of their aggregate force and support, concurred with the prevailing distaste for any other than physical and mechanical philosophy, in obscuring them: they, nevertheless, received all the attention that could reasonably be expected; no one having impugned, and some thinking individuals having countenanced them with approbation. Early and sudden popularity is not, however, a criterion of the truth and permanence of any doctrine; nor is true philosophy the property of a day, nor of its century, but of all ages: and he who writes in its spirit will defer to his subject only, and look forward without disappointment at least a hundred years, or till pre-established opinions shall have lost their influence, and unbiassed judgment, with enlarged powers, shall have taken their place. If, then, his labours shall acquire no esteem, he may assure himself that they will not merit any; and may rejoice if, having blindly or rashly dared to wander from the beaten track, he may have the

good fortune to encounter neither obstruction nor persecution, and grateful to have lived when and where a man may deliver his honest opinions with freedom and protection.*

With an eye thus distantly inclined, and desirous only that these Outlines should live in their truth, we continue in other respects indifferent to their fate. Truth is our aim, and nature our authority,—not to the exclusion of all other authorities, but as a court of appeal to revise the decisions of our precursors; that, while availing ourselves of their discoveries and disregarding their mistakes and errors, we may advance the interests of truth, and promote the great ends of philosophy.

If, regarding as we do with just admiration the celebrated productions of philosophers, there be yet apparent arrogance in these professions, we disclaim it: humbly estimating our own powers, but believing it to be both a right and a duty of every free intellect to investigate to the utmost of his ability the whole domain of intelligence,—to communicate the sum of his discoveries, whatever they may be, to other minds,—and to serve truth at all sacrifices, as debts to the Author of his faculties, and as an entail due with interest to posterity for what he may have derived or inherited from his predecessors.

In philosophy, as in fine art, the only infallible

* "Rara temporum felicitate, ubi sentire quæ velis, et quæ sentias dicere licet."—Tacit. *Hist.* præm. i.

school is nature, rightly understood; and as refined art is only *generalized nature*, so genuine philosophy is no other than *nature universalized*, and not natural history, constituted of *particulars*, experiments, and imperfect inductions, nor partial doctrines and hypotheses. In philosophy and art there are, therefore, no authorities but in right of nature; which, though ultimate, is not exclusive of all other authorities, but is the archetype and standard by which the genuineness and sufficiency of all the productions of philosophy must be tested: if, therefore, we do absolute homage to no other system than that of truth and nature, we are zealous of no other proselyte to our own, and deprecate the advocacy of error in behalf of any doctrine.

Man is both bodily and mentally so much the creature of habit, that it is in general a vain attempt to instruct anew either the educated or the aged: they will continue to attach their accustomed meanings to words, and their tutored thoughts will run in the same beaten track,—with all such, authorities become tutelary, and an idol stands them in the place of truth; hence their will, too, becomes interested on the side to which they have long given up their judgment: with them, conviction even is but momentary; and such proselytes to new doctrines very soon become their apostates.

With those especially who are trained in any particular science, class, or profession, a habit in-

sensibly grows of regarding it as principal, and of subordinating all other things to their own view, pursuit, or calling: hence men of learning, taught in a particular school, or bred in a particular discipline, are commonly accustomed to refer all things to particular authorities, and to disregard or impugn, as heretical and dangerous, whatever is not thus sanctioned,—leaning solely on the minds of others, their own faculties become enervated, and they startle at an unusual proposition, or a new thought: hence, also, prejudice and rivalry among the Sciences, than which there can be nothing more ridiculous, since they have all a universal and common aim. And these are vices and pedantries not of schools and individuals only, but of parties, nations, and generations also; and they are extremes hardly less mischievous than is the rejection of all established authorities.

Authors, too, have been more assiduous to controvert error than to promulgate truth, and have regarded it as no less essential to subvert the doctrines of others than to establish their own; as if the object of philosophy were conquest, and not alliance: yet is not the wisdom of such a course greater than would be his, who, in attempting to clear a fluid, should disturb its feculence? or his who should endeavour to drive out darkness from an apartment in order to admit the light? for truth, like light, shines by its own effulgence, and need but be shewn to be acknow-

ledged, and error is but the feculence of philosophy, which will subside spontaneously, if left undisturbed, or if gently agitated only. This light and clearness of truth all profess to be the great aim of philosophy; and truth in philosophy is naught but conformity to nature: add to which, that the philosopher need in general give himself little concern about erroneous opinions, since he may often discover truth in its purity with less labour than he can detach it from falsehood and error.

The early philosophers had no other school of learning than that of nature, and therein they effected wonders; and it was not till their successors quitted the contemplation of nature for the easier speculations of fancy and figure, through which they converted philosophy into poetry, and sought truth in the opinions of others, that schools were established in which *learning* supplanted *philosophy*, and in the hostile doctrines and authorities of which nature was lost sight of, and truth confounded. In this way philosophers have proceeded, dogmatizing upon error or falling into scepticism, leaving at last no hope for the votary of truth but to banish complication, pedantry, and poetry, and return to simplicity and nature.

The great Verulam called, also, upon philosophers to return to nature; but it was chiefly to external nature and particulars, which avail only

in Physics, which are but one branch of philosophy, and that which, however necessary, is by no means the most important: a course which enhances, also, the fallacy of regarding every thing upon a material and sensible foundation, to which the immature mind has ever been too naturally prone, and which, while it qualifies a man for the world and its ways, almost incapacitates him for a true conception of the universe, or of that which constitutes it; nor can it ever supply perfect universal conceptions.

Still, one of the greatest obstacles to the progress of philosophy in a more advanced state of human intelligence, and more especially so among the antients, has been the propensity of writers to poetize truth,—to give to every thing the figure and attributes of humanity, and to dress and decorate these figures with all the license of fancy, till what was designed for illustration obscured its objects, the play of reason sunk into the revelry of sense, and truth and its analogy were lost.

This disposition of the pen has undoubtedly been fostered by false taste and the false fame flowing upon writers from the sensuality of readers, by which they have been led to prefer sound to signification, and an elegant diction to correct thought. It is in the ultimate purification of intellect alone that the mind seeks harmony of thought instead of the harmony of sense, and

reason and philosophy attain their right end and authority.

When we consider further that the whole of literature and the established current of men's minds have to undergo a change or a check with all the variations and revolutions of philosophy, and when we regard its many failures and disappointments, we can hardly be surprised that little encouragement should be at once conceded to any considerable innovation in philosophy, however requisite; or that such should be commonly regarded with suspicion, prejudice, and party-spirit.

Inasmuch as knowledge is power, the propensities of men have produced results in the government of learning similar to those in politics, and they have disposed the one to take the forms of the other; and although individual authority is incompatible with the freedom of learning, and we talk of the republic of letters, and of the liberty and licentiousness of the press, there is in reality no such unqualified freedom of learning; but knowledge and the press are, rather, ruled conventionally by a fluctuating government, in which there is a perpetual contention among leaders and parties, who are often less influenced by the true interests of science than by personal motives. These leaders set the fashion, and the unthinking follow, of course, till the fashion changes; and he who makes up his mind to be much out of the fashion, however conscientiously for truth or good, may

expect to be pointed at, if even he escape vulgar abuse and molestation.

Nor are the foregoing all the obstacles opposed to the advancement of philosophy: nevertheless, truth and justice find favour in the end, and rise, like a cork above the water, whenever the force that depresses them is removed; and there is this double consolation under censure for their votaries, that the sting of misrepresentation inflicts but temporary pain, while merited correction accomplishes the end of the sincere, and affords them permanent pleasure.

Yet it is an inquiry of no great consideration here what part the will and passions, or gross interests and habits of men, play in these obstructions and corruptions of philosophy; their mistakes are sufficient, without their vices, for its depravation; and the thing still wanting is a true, universal, and correct system.

We, however, neither maintain the absolute freedom and license of thought, — nor that proposed reforms do not sometimes merit reprobation,—nor do we assert that all past doctrines of philosophy are compounds of errors and corruption. On the contrary, we hold, that without regulation there could be no useful knowledge; and that every system or opinion that ever obtained currency, or sustained itself temporarily, did so entirely by the force of truth, and fell into discredit in the end solely by the alloy of error; for some portion of

truth is essential to qualify and hold together any hypothesis: it is the cementing principle, without which even falsehood could have no consistency, no plausibility, no power to pass current, and none at all to deceive. Every philosophy has, therefore, been upheld for its time by truth: often partial, perhaps, or right only according to the direction and breadth of its holding, but deficient of universality, and dashed with error.

It follows, therefore, that we impugn no philosophy absolutely, and that all doctrines are to be studied by the philosopher in search of evidence, not as fixed authorities, but always with reference to nature, and no other school; as the true artist studies pictures, in which, if nature sanction not their reputation and authority, the works founded upon such studies become at best but copies, imitations, or academic exercises, destitute of original value. It is this appeal to nature and subordination of art, with right faculties, penetration, and assiduity, that attains the station and name of genius in art and philosophy; and if the genius of the antients appears to have transcended that of the moderns in both, it has been because the former, through necessity and just discernment, studied nature, as we, for their excellences, have studied them.

In this study of schools and doctrines it is equally expedient that the philosopher should reject whatever is not either universal or of uni-

versal consistency; for it is chiefly, if not solely, in their errors, that philosophers differ. To controvert or oppose in any other way the doctrines of his predecessors, is at best but supererogatory, and no part of the ministration of the true philosopher; while, on the other hand, systems and philosophies harmonize inasmuch as they are founded upon truth, and in their agreement truth may properly be sought: it becomes, therefore, a duty of the philosopher to investigate as widely as possible the circumstances of such agreement; and in this all have concurred, that there can be but one true philosophy,—one universal system,—which is the aim of all philosophers: nor is there any thing unreasonable in the expectation that the time will arrive when, from the accumulated researches of philosophers, philosophy will become, theoretically and practically, one and universal; for philosophy, truth, and nature, are the same; and with these art also can alone attain perfection, since right-knowing is pre-essential to right-doing.

Yet, although there be but one true philosophy, it does not follow that there are not, in the research thereof, many ways of developement, many points of view and departure; but, in whatever way the infinite scheme of Nature is regarded, it presents to the philosopher a diversity which is literally boundless. It is not surprising, therefore, that so much difficulty should have frustrated the giving laws, as it were, to infinity, and unity and

order to boundless variety: the individual mind naturally shrinks from the immense attempt, through a diffidence of its powers, although it is impelled by an irresistible desire and a natural capacity to comprehend the whole.

To gratify this essential propensity to knowledge, men have in all ages adventured in a vast variety of directions into nature, and have, according to the diversity of taste and circumstances, explored portions of this extensive field, as distinct systems or sciences, more or less perfectly, but with little of general agreement, often masking error with truth, and sometimes assailing each other's labours with a hostility that savours little of the spirit of truth, of which the prime attribute is unity.

Others, observing points of agreement among these diversified inquiries, or led by analogy, have enlarged their views toward the higher genera of things, gradually approaching that universality which aims at comprehending all nature; whence have sprung the chief schemes of philosophy. But here, unfortunately, the imperfections of the minor plans thus connected, and the diversity of foundation upon which they have been raised, have vitiated the source, and produced that discordance of systems which is the reproach of philosophy, and of which we believe the only remedy and corrective to be the reverting to nature, and the disregarding of whatever is peculiar in the systems and works of

philosophers; while we take to our aid all those principles and developements in which they have concurred, or which all are bound to acknowledge, and place them upon one sole foundation.

The method of our attempt in these respects will appear in the following Outlines: as introductory to which, it may be expedient that we take some very general surveys of the progress, fluctuations, and decline, historical and doctrinal, of the philosophy of past ages, keeping in mind that our purpose is not to write a history, but to elucidate the system of science.

Ere science, then, had a history, or philosophy a name, the human mind, unassisted by inspiration, would have made its advances through a long and oblivious period, of which there could be only conjecture; but if we take our view of the whole circle of art and philosophy, from the earliest periods recorded to the present time, we may clearly distinguish three grand æras in their history:—the first was dignified and distinguished by the sublime dogmas of intellect and theology, when the arts were yet in their infancy, and physical nature little inquired into or understood. Then flourished Moses,—the Egyptian and Eastern sages, Zoroaster, Hermes, Sanconiatho, — Orpheus, Thales, Pythagoras, Socrates, Plato, Aristotle,—and then came the Divine Jesus, His Apostles, and their Disciples; and this may be termed the *Æra of Intellect.*

To this æra succeeded the middle age, the *Æra of Sense,* the meridian of art, in the lustre of which shone a Homer, a Philocles,—a Pericles, a Phidias, a Praxiteles, an Apelles, a Terpander, an Euripides, a Demosthenes, an Epicurus,—a Terence, a Roscius, a Cicero, a Virgil, a Horace, a Longinus, a Guido, an Angelo, a Raphael, a Titian, a Shakspeare, a Milton, a Claud, a Rubens, and a Reynolds: stars in a train of geniuses too long to be here enumerated, who carried the sensible arts to exalted perfection, and became models to succeeding ages.

Last in the course of science came the votaries of physical nature, and theirs has been the *Æra of Matter,* in which have arisen those luminaries of material and mechanic science, Euclid, Archimedes, Copernicus, Columbus, Bacon, Harvey, Galileo, Kepler, Descartes, Kircher, Newton, Linneus, Stahl, Cooke, Franklin, Priestley, Black, Cavendish, Lavosier, Brown, Watt, Arkwright, Herschel, Davy, and a thousand other great distinguishers of an æra which seems in our times to approach its acme.

It is true that these periods are not marked by distinct boundaries, that they run the same course from different points, sometimes together penetrating deeply into each other, and that ability in each department of science has appeared in all ages; but it is sufficient to our argument that each æra is characterized and distinguished in the mass. And although speculative philosophy from the

commencement, upon the whole, descended from the moral to the physical station, yet in the partial career of the Grecian schools it took the contrary direction, beginning with speculative *physics*, from Thales, in the Pythagoric and Italic schools,—becoming *logical*, under Zeno, in the Eleatic school,—and then *ethical*, under Socrates and the Ionic school; from which distinctions came, doubtlessly, the antient distribution of philosophy into Physics, Logic, and Ethics, under Plato and Aristotle, who united them: and from these schools, according to Themistius, sprung no less than three hundred sects.

Nor is the foregoing distribution entirely coincident with the three periods into which the history of philosophy is usually divided; namely, first, the *Antient* period, comprehending that of the Greeks, Romans, their predecessors and immediate followers; secondly, the *Middle*, or scholastic age, between the decline of the Grecian and rise of the modern philosophies; and, thirdly, the *Modern* period, commencing with Bacon and his times: for this distribution is chronological, and not philosophical.

It will be evident, upon reflection, that the above course and characteristics of philosophers, and the learned, have been in effect nearly the reverse of the character and progress of the mass of mankind, and of the natural advances of the human mind during the same periods, and that the former has been in a great measure determined by

the latter; for, as the first recorded æra was that of intellect, in which the learned were the moral instructors of mankind, who were then in a natural or physical state of intellect, so, on the present extreme, and in the present æra, in which the mass of mankind has become more enlightened, intellectual and artificial learning have quitted the moral, and taken the physical character; while, in the middle state, and æra of sensitive art, society had emerged from savage life, without having attained any high degree of general intelligence.

We may perceive herein the moral compensation of the ruling and Divine Power, by which nature and intelligence have been balanced in the species, and sustained throughout all times for the advancement of the destination of man. The first period was principally passive or contemplative, or that of the philosophy of thought, as the latter period is active or practical, or that of the philosophy of things, and their connecting period was of a mixed character, being that of the philosophy of sensation; neither of them purely either, but predominantly and in subordination: and we have, accordingly, seen the speculative philosophy of Germany arise amid the practical philosophy of the rest of Europe and the world.

There remains yet, for the progress of mankind, that philosophy should accomplish another æra, in which the influences of the three former shall be balanced and united as a whole.

In this survey of the history of science may be found convincing evidence of the vicious tendencies peculiar to the times of its partial prevalence. The first æra converted morals and religion into *Mysticism*, — witness the mysteries of Egypt, Hindostan, Persia, and Greece; the second sunk the refinements of art into *Epicurism*, — witness the gross sensualities of its times; and the last has corrupted morals and religion by *Materialism*, — witness the spirit of our own times. Similar to these are the tendencies of partial science also upon the human mind, individual and political.

Nor is it hence unreasonable to expect that the effects of the union and concurrence of these three influences of science will be reciprocal correction— a new and direct impulse of the human mind, individual and social, to the goal of all science—the fruition of all faculties — the happiness of man under the dominion of reason and universal philosophy, the fruit and final purpose of his temporal knowledge and existence.

Again: reviewing conversely the whole history of philosophy, there is nothing more remarkable than the recession from that simplicity and universality which we deem to be the essential characteristics of true philosophy, to particularity and complexity; whence we find modern philosophers engaged in the boundless research of particulars, concerning which they present us views of surprising subtility, precision, and diversity, but alto-

gether destitute of that breadth of principle which distinguished the philosophy of the ancients, the original source of their own.

This diffuse philosophy and science of modern Europe sprung immediately from the Romans,—the Roman from the sects of Aristotle, Zeno, and Epicurus, or the Peripatetic, Stoic, and Epicurean, otherwise denominated of the Lyceum, the Porch, and the Garden. The sectaries of Greece were the fruitful offspring of the schools of Thales and Pythagoras; and these sages, natives of the isles and coast of Asia Minor, together with their disciples, transplanted philosophy into Greece from Egypt, Chaldæa, and the East.

Such are the *historical relations* of philosophy variously viewed in the abstract; and if, in again descending from this height, we regard it in its *philosophical relations*, we find a gradual decline from the pure *intellectual* philosophy of the East, upon which religion and morals depend, through the *sensual* doctrine of Epicurus, in which the Grecian schools terminated, to the *material*, physical, or natural philosophy which distinguishes our own times, and while it augments the number of material goods, diminishes their security, by being furthest of all removed from the moral. And if the antients fell upon a false extreme by intellectualizing physics, the moderns have more lamentably erred by physicizing intellect to such an opposite extreme, as to have materialized and

mechanized both the operations and the faculties of the mind,—an influence still effective, as we see in the new sciences of Phrenology and Animal Magnetism.

Thus, all the long train of philosophers, from the first dawn of philosophy, have built upon its primitive universal foundation, more and more particularizing in succession, whereby the branches of philosophy have been extended, while the roots have been neglected. It is not, however, in the accumulation, but in the just distribution, of knowledge, that the force of philosophy consists; "and if you will have sciences grow," says the great Verulam, "you need not be so solicitous for the bodies; apply all your care that the roots may be taken up sound and entire."

Nor has this advice of Bacon, the greatest of the modern reformers of philosophy (who has been justly designated by an eminent French author and critic as the Father of Experimental Philosophy, who, like Socrates, brought learning down from the mere visions of abstraction to solid science), been entirely unheeded by succeeding philosophers; some of whom have carried it to such an extreme, as to give to their systems a vigour at the root which fails altogether in the branches: and to some such inconsequence it may be attributed that the modern speculative philosophies of Germany have failed to obtain any footing in Britain, where the plant is esteemed for its fruit.

That philosophy should thus generally have quitted the contemplative or speculative ground of antiquity, and resorted, for an apparently firmer basis, to the material, experimental, and practical method, which is its opposite extreme, is no wonder to him who is acquainted with the history of modern failures in philosophy, founded on the ancient systems, and which have terminated in this new and opposite course, that has conducted, ever since the time of Bacon, to such astonishing results in the physics or natural philosophy, and the mechanic arts of the moderns, and of Britain in particular.

But, in other branches of philosophy, the Baconian method appears to have produced little other effect than an indifference of mind towards them; for it is a constant error of mankind to resort to extremes, regardless of the mean, in their pursuits: and hence it is, that, in a review of the sects and systems of philosophy, whatever course they may have taken, we invariably find them commencing in absolute dogmatism, and terminating in the most indecisive scepticism.

It was the same in the religio-scholastic philosophies of the polemic schools of Europe, which confounded Grecian philosophy with Christianity, and waged inglorious war upon each other with the logic of Aristotle, under the banners of nominalism, realism, and conceptualism, to determine whether the *ideas* of Plato were *names*, *things*, or *thoughts*; and it has been the same with the

schools by which they were supplanted; namely, those of Bacon, Descartes, and Leibnitz,—whose followers have fallen, in their turn, under the spirit of sceptical indecision, successively in England and France, and finally so in the new schools in Germany.

Of these great reformers of the schools, Bacon began by repressing the jargon of *names*, aimed at fixing attention upon *things*, and laboured to raise philosophy, by means of experience, upon the solid foundation of physical and external nature. Descartes followed; and, with like hostility to the schools, endeavoured to re-establish philosophy internally, upon meditation or *thought*, by which man was to deduce every thing from his own powers. Leibnitz, who succeeded them closely, very naturally took a middle course between these extremes, and by connecting the facts of experience with the principles of the mind,—external with internal nature, or things with thoughts,—proposed to establish the only secure basis of philosophy, whence followed the modern German school. But, however these great men differed in process, and although they were themselves tinctured with the doctrines of the schools, they agreed at least in their endeavours to subvert the authority of the latter; in which they and their followers entirely succeeded, although their successors have fallen, in their turn, into the common receptacle of scepticism.

Philosophy, however, like the phœnix, rises perpetually from her ashes, and in Britain there has sprung from the embers of scepticism a practical philosophy, founded on the beneficial principle of material and experimental utility, which has already exercised its mighty influence throughout the world, and will run its course; yet the spirit is alive, and manifesting itself, which will again revive the intellectual and moral genius of philosophy in Britain, in connexion with solid science.

So much for the position and progress of philosophy historically; and, again, with regard to its doctrines only. As universal philosophy comprehends inherently the relations of science, and corresponds to those of man and the universe, every sect and system must partake of some or all of these relations, if it be in any respect philosophic: we may, therefore, distribute the sects and systems of philosophy into three classes, corresponding to the first relations of science, as follows:

First, that of the MATERIALISTS, whose doctrines are physically founded; secondly, that of the EXPERIMENTALISTS, or empiricists, grounded upon sense and experience; and, thirdly, that of the INTELLECTUALISTS, founded alone upon mind, as distinguished from matter and sense. And each of these is positive or dogmatical in asserting the reality of its own foundation, and negative or sceptical in doubting and denying of the others. The universal

DOGMATIST, or active philosopher, is, therefore, he who asserts the universal reality or absoluteness of things; and the universal SCEPTIC, or passive philosopher, is he who, without asserting any thing, doubts and denies universally.

The first character of such *dogmatism*, in the general history of philosophy, and in every age which may be regarded as philosophic, is material; in its progress it becomes sensual, and in its refinement intellectual; and it is from the clash of these characteristics that *scepticism* arises: and this, we have seen, is the natural course of philosophy, not only universally, and as regards particular æras, but in respect also to the individual mind, the form of which, physically and morally, is that of the species; and the life of an individual characterizes the history of the species: nor do ages differ in these respects more than individuals, for the distinctions of men and ages are alike a logical distinction of genus, species, and individuals.

The above distinctions of sects are not absolute but relative, and exist not pure and independently, but compound, and divide into that variety of secondary and subordinate sects with which the history of philosophy abounds. Hence, all these sects and their systems are partial, and they err alike in regarding the natures or principles whereon they are founded as *absolute and independent*, when, in truth, they are correlative, co-essential, and co-existent.

Of the inadequacy of any kind of absolutism to a truly rational explanation of the natural universe, we may be convinced by its course among metaphysicians and philosophers. Thus, Locke attributes all our knowledge to ideas, which are *mental representations of things;* Berkeley annihilates the *material things;* and Hume, inverting the argument of the latter, annihilates the *intelligent spirit.* Hence, scepticism and nihilism are the results of these three species of absolutism or dogmatism; and it is through analogism alone that spirit, matter, and representation, can be restored to their correlative and co-essential reality. The two first of these,—namely, spirit and matter,—are, in fact, to the intellectual or internal world, what the elements of material things are to the physical or external world, — though, in reality, subsisting apart, they are cognoscible only in connexion: they are, as it were, the principles of a mental electricity, which, though existing separately, are apparent to consciousness only when brought into union.

One of the chief mischiefs of absolutism, which regards existence and all things as positive, consists in the annihilation of all antagonists. Thus, the antagonists of matter, light, heat, motion, good, &c. — viz. spirit or mind, darkness, cold, rest, evil, &c. — are, according to this manner of viewing things, nonentities or mere negations.

Every man is in some sense a philosopher; and universal *Dogmatism,* or Absolutism, is the com-

monest, or vulgar doctrine: it first divided in the three before-mentioned relations, each of which flourished in its turn, till universal *Scepticism*, notwithstanding it is furthest removed from the common notions of mankind, supplanted them all. The Sceptic irresistibly opposes the dogmatic sects, material, experimental, and intellectual, to each other, and with reason rejects them all, because of their total discordance; while he falls into their error of regarding things as *absolute*, or as *nothing*, when, in truth, there is yet another alternative, which has escaped notice, between the absolute state and nonentity; namely, a *universal relative state*, which may be termed *analogical:* and which is, therefore, the medium and ground of reconciliation between the discordant sects, dogmatical and sceptical.

And this completes the outline of all possible sects and systems,—the dogmatical, sceptical, and analogical being genera respectively to the material, experimental, and intellectual sects, as in the following Table:

PHILOSOPHIC SECTS.

DOGMATIST,			ANALOGIST,			SCEPTIC.		
Materialist.	Experimentalist,	Intellectualist,	Materialist.	Experimentalist,	Intellectualist,	Materialist.	Experimentalist.	Intellectualist.

All these belong to the reality of nature, and are therefore philosophic.

Speculation has not, however, confined itself to natural ground, but, transcending scepticism, has attempted to establish supernatural philosophies (which is a contradiction in terms) in the mystic regions of fancy, where philosophy is negated, and poetry asserted. *Mysticism*, therefore, although capable of an endless variety of forms, belongs not to philosophy, but to the sublimest species of poetry, in which fiction substitutes truth, and reason is subjected to imagination.

Dogmatism, or the regarding of things as *absolute*, has engaged philosophers perpetually in the search of simple causes, and it has given rise to the axiom, that nothing can exist without a cause; but if nothing can exist without a cause, there can be no first cause, or the first cause is nothing, which is absurd: and, since things are universally relative, there is no category of cause, and no such thing as simple cause, but every effect is the result or produce of concurrence, which cannot be of one thing, but must be of *correlatives*. Hence, the First Cause is truly and philosophically a plurality in unity; and the doctrine of simple causes involves absurdity, and has no ground to rest upon. But, while dogmatism impels the mind to a first cause, which it can never reach, it neither does nor can determine its species, whether it be material or intellectual; yet, wanting an adequate

notion of intellectual cause, it tends to materialism and atheism.*

On the other hand, SCEPTICISM (which comprehends the dogmatism of all other sects, and is, therefore, itself extremely dogmatical,) opposes one species of cause to another, and thereby destroys the absolute ground which it borrows from the other sects, and produces *negation* and suspension. Accordingly, scepticism, both ancient and modern, has sprung out of the ruins, and flourished upon the fallacies, of the dogmatic sects: it flatters not the powers of man; and, though it satisfies none of the demands of reason and philosophy, but terminates in nihilism, it has operated as a salutary check to the too hasty determinations of the dogmatists, and urged to others more correct. Its inconsistencies are, that while it is skilful in detect-

* Such was the tendency and end of Mr. Hume's scepticism, founded on the argument of the Chevalier Ramsay; who, however, employed it to a very different purpose. The following are his words: — "We have no adequate idea of power [or causation]—we see evidently that there must be such a thing in nature, but we cannot conceive how it acts, nor what connects the producing cause with the produced effect."[1] But all *cause*, we have argued, consists in the concurrence of an agent and re-agent, or patient; and *effect* consists in their union, and is thence simultaneous and identical with its cause; and therefore there can be no priority or intermediate between them; but they are co-essential, inseparable, immediate, or without intervening connexion, and identical.

[1] Prin. of Nat. and Rev. Relig. vol. i. p. 109.

ing of wrong, it fails from establishing of right,—and while it wars with all other sects, and totally destroys every source of dependence and satisfaction, it assumes *astaraxia*, or tranquillity, as its chief object and end; but he who is most unsettled in belief or opinion, is most disturbed in mind; and it is a fact, that doubt and ignorance in the inquiring mind produce dejection and perturbation of spirit: and such is eminently the effect of scepticism.

Thus dogmatism and scepticism tend alike to destroy religious and philosophic consolation and dependence, and bring reproach upon reason and philosophy: they are extremes without a mean, perpetually at variance. There is, nevertheless, as before remarked, a position to be yet attained between these extremes, in which things are regarded as *relative*, and not as *absolute;* not as *positive* with dogmatism, nor as *negative* with scepticism, but as *universally correlative or analogous.*

This position belongs, therefore, to ANALOGISM, which is the mean for harmonizing the discordances of the sects: it demonstrates that, all knowledge being relative, the absolute lies beyond its sphere, and thereby annihilates the ground of both dogmatism and scepticism, while it escapes from the extremes of confidence and distrust. More assiduous to establish true relations than to confute error, it teaches that all cause consists in concurrence, and that universal coincidence gives to the phi-

losophic universe that consistency which universal gravitation gives to the physical,—assimilating all things in unity of essence, relation, and end. It determines the scope of knowledge, and bounds it by irrefragable universal correlatives, which are the ground of knowledge, and therefore are unconditional and unknowable in essence: beyond which inquiry and dispute involve absurdity, and reason, in its last resort, bends to that Incomprehensible Original, to whom it attributes "all wisdom, power, and goodness,"—"in whom we live, move, and have our being,"—"who is in us, and we in Him,"—"who is all in all,"—"the Being of beings,"—and "every where always."

That a philosophy similar to this in many respects arose early among mankind, and was perhaps coeval with the literal invention of letters as elements of speech, might, by a due investigation, be rendered apparent,—a philosophy which, having prevailed in the East in times of the remotest antiquity, after degenerating from its high moral and intellectual destination, laid the foundation of profane learning, and wrought from the fine senses and intellect of the antient Greeks the sublimest productions of human genius; and since it has conduced to art and science, and promoted the best interests of mankind, it behoves us to cherish the remains of this philosophy, and to endeavour to restore it at the root. It is, accordingly, the design of the following Outlines to investigate the

root and ground of philosophy in quest of the principles, relations, and purposes of nature, art, and science; while we aim, also, at supplying a deficiency of the syllogistic and inductive methods, and thereby at restoring philosophy to its original ground and native simplicity, upon the basis of a genuine logical analogy, which supplies the forms sought through induction, and the universals to which syllogism owes its validity.

We have thus arrived at the main object of our work, which is by a universal analysis, upon a single principle, to develope, or at least to indicate, *the true Analogical System of the Universe*, throughout its various branches,—to trace it to its sacred source,—and to establish, if not a totally new, yet an original and hitherto neglected, method of philosophizing by Analogism, upon the ground of which, by the exhausting course of previous philosophies, philosophers are naturally impelled. The chief strength of the antient systems lies in first principles,—their weakness in their application, through reasoning without data, to extreme particulars and practice. On the other hand, the strength of modern philosophy lies in the correct observation of phenomena, and the accuracy of particulars and practice,—and its weakness in the assumption of first principles, borrowed generally from antient systems. The connecting media are wanting in both, and can alone be supplied by a due analogical process.

" The antients (says Sydenham, in a note to the ' Meno' of Plato, p. 119) in philosophizing, began always from *sensible* objects and from *outward* nature: thence they proceeded to *intelligible* ideas, the objects of mind itself. The moderns philosophize as if sensible objects had no natural connexion with objects intelligible, and as if outward nature was independent of mind; by which conduct of theirs, *physics* and *metaphysics* come to be considered as two provinces quite distinct and remote from each other:" the one attached intelligence to sense, and discarded matter,—the other attaches sensation to matter, and discards mind; while both have admitted the celebrated maxim, that nothing is in intellect that was not first in sense: although the converse of the maxim is equally true or untrue; for correlatives admit of no priority. Contrary to this antient method of philosophizing is that of the present work, which proceeds from the *intelligent and internal* correlatively to the *sentient*, and from the sentient medium correlatively to *external* nature; and it differs from the modern, and agrees with the antient methods, in regarding the two extremes of philosophy,—the physical and the metaphysical, — as inseparably united in nature: thus partly agreeing with each, it aims at combining and reconciling the two methods together. And as these methods are infused into the roots and distinctions of philosophy not only as antient and modern, but as

any how differing in sect, our method tends to the harmonizing of the whole.

A design of such natural magnitude and sublimity as that before us, might well have demanded higher powers, fairer opportunities, and a better and more extended *execution* than ours; but, since these have been wanting, we can only hope to have pointed out a way, or to have laid a foundation, upon which more able hands may build: consoling ourselves, also, in the reflection, that things of greatest moment to mankind have proceeded from mean beginnings, and that the greatest difficulty in advancing art or science, has been overcome when either has been set in motion in a right direction.

One of the principal obstacles which lies in the way to the adoption of a new system is the unprepared state of men's minds with respect to words and terms, and the manner of their associations, by which they lead thought into beaten tracks. To obviate, in some measure, these difficulties, we have avoided unnecessary change of signification in using the former, and have connected the whole of the Outlines in a somewhat free and popular manner by a short introduction to each, so as to lead the mind from its habitual course and position to that of our essays. In this attempt, whether justly or in error, we have adopted a *synoptical plan*, because we regard the analytical method as essentially synoptical, and most correctly doctrinal. It

remains that we subjoin a few explanations, in anticipation of probable objections; which may serve, also, as some sort of apology for inadequacy, errors, or assumption, in its execution.

It may be objected by some persons, that we have deviated throughout these Outlines from the technical forms and language of their respective sciences,—that we have written of logic, not in the manner of logicians,—of geometry, not as geometricians,—of music, not as musicians, &c. But it is to the circumstance of every art and science having a distinct form and nomenclature that we may attribute the slow advancement of science as a whole, and the confinement of mind common to each: we have, therefore, interpreted every science, as much as possible, upon one common principle and mode of reasoning, and studiously employed the ordinary style and language of literature throughout, which latter is sufficiently copious, with the occasional aid of a technical or a Greek compound, for all the purposes of unaffected science, in the adaptation of which we have always preferred the analogy of the English to that of the Greek when they do not agree; and if we have used a new or unauthorized term upon occasion, it has been with reluctance, and for the sake of perspicuity or analogy.

The elementary brevity, no less than the method and matter, of our Outlines, will perhaps occasion the disapprobation both of the incipient

and the proficient in particular sciences. To be brief and perspicuous where excellent matter abounded, has, nevertheless, been therein our greatest difficulty; and in this respect we have been compelled to sacrifice greatly to the *universality* of our plan, which is alone important at the beginning, and of which a correct superficiality is the perfection. Philosophy, like the ocean, has its surface as well as its depths; and the success of the man who would navigate it widely will depend principally upon his attention to the first, while he marks his course thereon by the lights above,—happy to escape from foundering in the depths, and to reach his destination.

So also those who employ their powers in digging deeply in the mines of particular science, cannot be expected to travel widely; nor ought we to be surprised if they are not very liberal to systematists, who, like geologists, connect the depths with the surface: in fact, systematists and theorists have been commonly stigmatized and contemned as sciolists and visionaries by the empiricist and practical man; they are both, nevertheless, brothers of the same family, and by favour, and in another figure, a slender work may at once descend deep and rise high. As that is not generally considered to be deep of which we can distinctly see the bottom, so an author is rarely regarded as profound who does not go further than his reader could easily accompany him; and as

the term profundity, applied to writing, very commonly means obscurity, so is the latter affected by some authors for the reputation of the former. Single, however, in our purpose, we have never been artificially obscure, nor emulous of astounding by our depth. And as to system, there is no truth independent of it; and whether the *mind* will be warped or rectified by a *system*, may depend on the fallacy or rectitude of either: but if a system be true, nothing but truth and rectitude can in the end arise from it; and if the mind be correct, it is in no danger. That much obloquy should have been attached to system has arisen from regarding false and specious combinations as true relations, and propagating them into palpable errors; but if ever truth and science should triumph universally, it will be by the force of a correct system only.

Some critical friends have objected against us that, although in their own particular science or pursuit they admit the correctness and natural sufficiency of our principles, they cannot but regard the extraordinary conformity therewith claimed for all other subjects as an assumption of invention or fancy, rather than the true ordinance of nature; but this objection, having been made in behalf of several sciences, becomes itself an argument in our favour, strong in proportion to its frequency: for if every professor is to be credited in his own science, this favourable testimony of many individuals will

amount to a fair induction for the whole. Nor, on the other hand, would the objection of failure in any particular department of science, or even of many of them, stand against our general doctrine, but merely point out occasions for correction; for a whole is distinct from its various parts. But those who have taken the most enlarged views, and have been best acquainted with the general subject and its parts, have offered fewest objections, and have been the readiest to admit the justness of our doctrine and arrangements.

If, travelling widely as we have done over all literary territory, we should not escape the charge of trespass, we may reply,—that, conducted by Nature or the force of system, we have repeatedly been surprised in our readings by anticipations of particulars, delivered even with similarity of expression. It is also the very nature of analogical philosophy to disclose coincidence and resemblance; for all relations, and every truth, involve them: and it has even occurred that we have trespassed, as it were, upon ourself, by having, in a varied direction of the mind, reinvested our own ground, or reinvented our previous conceptions. These may, however, be regarded as confirmations of truths, to which we cheerfully surrender priority. We protest, nevertheless, against the assumption of our principles into any other philosophy whose author never thought of our analogy, and would have disavowed it from his followers; for disciples

are prone, through a disingenuous zeal, to attribute all excellence to their master, and to translate all the strong points of others into their favourite form of doctrine. But, as to similitudes of thought or expression, there never was a writer deserving the name who was not also a reader,—there never was an artist of reputation in any way who did not study the works of others. In these ways men correct and extend their own ideas, store their minds, and form their styles; and in these ways every writer and every artist becomes a plagiary, if such appropriations can deserve the name.

To have done justice by acknowledgment to the merits and claims of even living authors, on the wide scale of our undertaking, would have doubled the length of our work; and to have cited coinciding authorities on the same scale, in an essay not commenced for publication, nor likely to become a work of reference, would have tripled not only its length, but its labour: we have, therefore, considered these citations as, in the first instance, uncalled for; and as altogether superfluous to the learned and intelligent reader.

As to any resemblance in the form of our doctrine to those symbolized by the Eastern philosophers, Hermetics, Gymnosophists, latter Platonists, Cabalists, Rosicrusians, Theosophists, Behmenites, Hutchinsonians, Masonics, or Metaphysicians, we have the answer, already given, that we are indebted to Nature and thought only for such

resemblances. Where the Mystics, in particular, obtained their dogmas, or through what compositions or corruptions of doctrines, is no inquiry of ours; all the coincidences we have with them are consequent to our preconceptions: and there is one respect in which we are directly opposed to most or all of them; namely, to really or pretendedly cloaking our doctrine in *mystery:* that which is not clearly to be understood, either as matter of fact or of reason, is nothing, or of no philosophic value for us. Nevertheless, truth may be in less danger when obscured or veiled than when naked or exposed; for such is the spirit of criticism, that he who writes clearly, and reaches the understanding, is likely to be *controverted,* while he who mysteriously addresses the imagination, will probably be *interpreted;* for the glory of bringing to light a hidden sense in the one case, or of confuting that which is apparent to common sense in the other, no less than for the more laudable object of the detecting of error.

That the philosophists have held extraordinary and sublime poetical notions, founded upon great and original truths, natural or revealed, and that there was, in times of ignorance, barbarity, and darkness, necessity or expediency for disguise, we think probable, and admit; but in times of free discussion and intelligence, mysteries are not marks of wisdom, but symbols of ignorance and darkness, or symptoms of the really having nothing to

disclose, under the mask of solemnity, and the assumption of superior, if not of supernatural knowledge: a knowledge which (without questioning the eternal and ever-present agency of the Divinity) the sanely religious and philosophic mind will ever disclaim, if by such is meant any thing not conformable to the grandest scale of regularity and order in the works and ways of Omnipotence.

We need hardly admonish the reader that our system is a whole not to be comprehended without consideration, nor clearly and adequately understood in parts, every part being of universal reference. It is hence obnoxious, in a remarkable degree, to the censure of the hypercritic; who, dipping partially into it, without having well studied it in its principles, and as a whole, will meet with the most gratifying paradoxes: nor will it be extraordinary if, on the wide scale of our inquiry, we should have committed mistakes or evinced deficiency, or that the individual sciences, as we have treated them, should be found defective; for in these times we have distinct sciences of many kinds in a state of high and extended cultivation, and a rapidity of progress in others that defies pursuit,—although, it must be admitted, we have hitherto no science of science itself.

Nor have we pretension to extraordinary superiority of information in any of the sciences, and profess not in these Outlines to have settled science in any of its departments, but only to have thrown

out hints whereon they may be remodelled, adapted, and improved, and to have laid a foundation for them in the doctrine of universal analogy, which gives form and consistency to the whole: we shall therefore be well content if the having established a principle and plan for their connexion be alone conceded to us; professing only, in humble and most distant comparison, as was professed by Pherecydes, the master of Pythagoras and father of Grecian philosophy, "to have opened a way to knowledge rather than to have discovered any thing." * Nor have we in any case infringed the laws or rules of philosophizing established by the high authority of Newton at the beginning of his "Principia:" † *allowing of no more causes than are true and sufficient—attributing similarity of causes to similar effects — and regarding action and reaction universally as coequal and opposed principles* throughout.

Should it seem to such as may take only a cursory view of our whole work, without looking to the solidity of its foundation, that we have indulged in a fanciful trichotomy,‡ we must again plead its prevalence throughout Nature, and that we regard

* Diog. Laert. de Vit. Dogm. Phil. lib. x. 122.

† Book iii.

‡ There have been many predilections with respect to numbers. Peter Ramus and his followers were extravagantly attached to a very useful *Dichotomy*, or division into pairs or extremes, without media,—adopted lately by Jeremy Bentham in his "Christomathia;" the Pythagoreans maintained a *Te-*

all *arbitrary triads* as unwarrantable, incongruous, and to be guarded against by the philosopher as leading only to absurdity and confusion; while we maintain it to be a criterion of the genuine philosophic triad that it is either a natural fact or a necessary reason, — correlative, complete, and not to be confuted. We reject, therefore, all arbitrary and fanciful triads as impressively as the true Christian, who founds his faith upon a Divine Trinity, rejects *tritheism;* foreseeing that the former leads to the ridiculous in philosophy, as certainly as the latter conducts to idolatry and absurdity in religion: without due attention to which, the Trinitarian will be exceedingly liable to fall into mystic, false, and fantastic doctrines. We have guarded, therefore, as sedulously against suffering any possible predilection to betray us into the trivial introduction of triads in our work; but if, nevertheless, the recurrence of genuine triads should tire attention, they may often be read unheeded without prejudice to the context: and it is to be borne in mind, that we write neither to please the ear nor delight the imagination, but to elicit thought and understanding.

And, notwithstanding a triadic arrangement pervades our entire system, it is not the principle, but an accident of our philosophy, from which it

tractyc system founded on analogy. See Taylor's "Pythag." p. 328, and "Theor. Arith." p. 190. And the works of Plato and Aristotle abound like nature with triads.

springs through essential reason, as, in like manner, it appears amid the particulars of Nature as a fact, and throughout its whole co-arrangement as a universal relation: it is, therefore, a necessary form of truth, and has attended all its movements, ever since the human mind began to operate, or knowledge took an erudite form. Accordingly, triadism has a history as antient as that of learning and science, and may be traced more extensively, perhaps, than any other human recognition.

It is not, however, with the remarkable history of triadism that we are principally concerned, nor with the instinct and superstitions by which it has been fostered, but with the truth, of which it is the relic, and on which it is founded: whence it stands as a form of Christian faith; belongs, in like manner, to consciousness; is a law of Nature and an axiom of science, concerning which the ministers of religion and defenders of the Holy Trinity, in modern times, have recorded much historical and literary matter, and volumes might be swelled with instances of its instinctive application throughout the particulars of literature, science, and art. There have been writers who have regarded it as an occasional form of regulation in Nature; but we know of none who have held it to be such universally. Of the first of these, the celebrated Jones of Nayland, equally eminent as a philosopher and theologian, has been the principal; and his friend, the late learned and excellent Dr. Harrington of

Bath, also introduced it, through geometrical analogy, into his favourite science of music, with the entire acquiescence of the late distinguished astronomer, Herschel; and it was by the approbation of Dr. Harrington that we, also, were encouraged, thirty years ago, in the prosecution of the plan now briefly developed: and, although the triadic form of doctrine therein sprung from our philosophy, we pretend not therefore to have originated *it*, nor have we followed it in any case for itself, but for the true analogical reasoning and original nature to which it inherently belongs.

Notwithstanding triadism had thus appeared, and sustained itself partially in all ages and countries by the bias of nature and tradition; and, although its prevalence had been remarked by eminent writers in some instances of nature and science, the universal analogy in which it is founded has not been disclosed by any: and, even in the high reference of religion, it has been maintained as a mystery, — an article of necessary faith alone,—divinely revealed,—beyond the power of philosophic solution, — solitary, — and entirely above reason, nature, and comprehension.

Thus much we have deemed it expedient to preliminate concerning this form of doctrine and its history, the particulars of which might supply matter for volumes of no ordinary interest and curiosity. Our chief object here is, however, to anticipate any prejudice against our plan and

method, which may arise from the regarding it as mere invention, innovation, or fantasy; and to protest against triadism being held forth as the first principle and matter of our philosophy, of which it is the form and offspring only.

But our best defence against any suspicion of fantastic doctrine, and a test of our genuineness, is, that we contend no further for our system than it may promote the interests of science, and the good of mankind; while we disclaim all zealotism, and deprecate, in the name of religion and philosophy, all proselytes who are not volunteers to truth alone: for, although truth acknowledges disciples, she does not admit of either sect or party. In attempting, therefore, the amalgamation of revelation and philosophy, we have been influenced by no vain design of subjecting either to either, in any of their forms, but solely by a desire to reconcile them through truth; and, although conscious of having by no means done justice to so capable a subject, yet, if we shall appear to have succeeded so far as to lead the philosophic and rational mind nearer to the truths of Christianity, we shall, without regret, have accomplished our object, not at all doubting that that faith in both, which most closely embraces truth, will in the end prevail; and that, hence, it becomes the interest of every form of Christianity to cultivate this holy alliance of reason and religion.

If, therefore, our doctrine shall offend any sect,

party, or individual,—religious or philosophic,—we can only plead our better intention, and patiently endure any obloquy it may incur; well assured that, however little power it may have upon the general mind, it will have, as it has already had in a less efficient form, salutary influence upon some individuals, and that it will ultimately receive its due measure of regard: while, with respect to just criticism, its object is the same as our own, and we hail it. That those, nevertheless, to whose doctrine ours may seem to be opposed, will be opposed to our doctrine, is reasonably to be expected: the Stoic and Epicurean in morals,—the Socinian in religion, — the republican, aristocrat, and despot, in politics,—and every partizan of an adverse doctrine, will, if ours shall be deemed worthy of notice, impugn and reject it; nor can there be any just objection to this in any case, if it be by fair argument, since it is better to be justly reproved, than it is to be falsely applauded: and the approbation of one truly candid and judicious mind, amounts, in the eye of reason, to the applause of all mankind.

Conscious of the inadequacy of the individual mind to the entire mastery of the various sciences during the short and encumbered span of human life, and of the impossibility of duly digesting the whole of philosophy, no less than of the continual occasion for recurring to reason and experience for the rectification of knowledge, we do not propose our

precepts as ordinances, but only as illustrations of universal philosophy, the most distantly removed from dogmatism; but since a single light cast upon an individual science is joyfully hailed by the philosopher, surely that which may reflect a new light, however dimly, upon every science and the whole circle of knowledge, cannot be totally unworthy of notice, nor liable to offend any but him who, from some sinister motive, or morbid feeling, cannot bear truth; as the diseased eye cannot bear the light.

One advantage, at least, awaits our attempt in an age wherein the public appetite for all sorts of knowledge, and an emulation for its universal diffusion, have called into existence so many journals of desultory science, and those immense aggregates of literature denominated Encyclopædias, in which all kinds of information are strung together alphabetically; and which, however excellent in detail, useful in reference, and abundant in variety of information, are destitute of unity, and devoid of that consistency which belongs to science as a whole; wanting which, the mind becomes overwhelmed by the superabundance of its increasing stores, and demands an adequate method of subordinating the diffuseness of knowledge to the unity of comprehension.

Accordingly, the present strenuous call for knowledge and diffuse education has produced a corresponding demand, accompanied by an aptitude

for the generalizations of science,—for the developement of its elements, and for the connexion of its parts,—to which we apparently owe several recent admirable productions, and may probably become indebted for others. Under such public circumstances, however, correct principles, a right distribution, and proper objects of knowledge are especially incumbent; for it is to evil purpose that knowledge is rendered accessible, if, at the same time, the acquisition of truth and virtue are not facilitated; any attempt, therefore, to combine these, although it should be but an attempt, is at least well timed and auspicious: and it especially behoves the regenerators of mankind to protect his innocence while they open his eyes, that knowledge may not grow without wisdom and virtue, nor that by which man should be sustained and perfected become the cause of his fall.

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PART I.

OUTLINE I.

UNIVERSAL PHILOSOPHY.

A BRIEF OUTLINE

OF

UNIVERSAL PHILOSOPHY.

CHAPTER I.

FIRST PRINCIPLES.

SECTION I.

1. THE philosopher, involved as a part in that universe which it is his desire to interpret, like Archimedes, wants a place on which to rest his powers to raise the world. His first position must be a part of what he has to prove; and hence, it is in vain that he endeavours to posite his system upon that which is absolutely independent: for though he may perpetually exhibit the ground on which he stands, by changing his place within the sphere of all possible knowledge, he cannot do so by transcendence or anteriority.

2. He presumes, therefore, to centre his system upon something conditional or granted, to be proved and sustained, like the world, by the *universal coin-*

cidence of the system itself, still arguing in a circle, that would be vitious for a being out of it; but is not so for him who is confined within its boundary, and a part thereof.

3. In other words, since that which is universal must comprehend its own foundation, the principles or groundwork of a universal system can have no unconditionate proof or support but that of universal coincidence; yet, if the foundation assumed contain no repugnance, the denying it will involve an absurdity: hence, the first positions or principles of the universal philosopher are stipulations not to be proved, but granted.* He cannot assert his ground, on the one hand; and, on the other, it cannot be denied him.†

SECTION II.

4. Now, the philosopher must either relinquish all *knowledge* and *existence* — his universe — or admit *something which knows,* or is conscious, and something which acts, or exists (for nothing exists but in action); and if he admit something which acts, he must also admit something which is acted upon: further, also, the *existence* is neither that-which-acts, nor that-which-is-acted-on, but the *effect* of their concurrence. So, again, the *knowledge*

* They are *postulates.*

† There is no *absolute*, but only *relative*, knowledge.

is neither that-which-knows, or consciousness, or conscience;* nor that-which-is-known, or existence, but their concurrent *effect.*

5. We claim, therefore, as universal facts, that ***all existence is the effect of action and passion*** (or re-action), and, consequently, of an agent and patient (or re-agent); and that *all knowledge is the effect of the concurrence of that-which-knows, or consciousness, and that-which-is-known, or exists.*

6. It must hence be admitted, that there are two universal kinds of *effects*—those of knowledge, and those of existence; the first of which may be called conscious, intelligent, or INTERNAL, and the latter existent, material, or EXTERNAL; and as the effects denominated external are those of an agent and patient, and, in like manner, the effects denominated internal belong to a similar agency and re-agency; and if the philosopher must ***know*** or admit *existence* and the external, it follows that it can be only by a like agency and re-agency, or *concurrence* between *that-which-knows,* or consciousness, and *that-which-exists,* or existence: and this concurrence must produce a third kind, or universal distinction of effects, differing from those either of the external or internal, and which, as their joint produce, may be called MEDIAL, or sentient; and such are, accordingly, the effects of sensation.

* The last of these is the proper analogous term here, but custom has confined it to an ethical signification.

7. It follows, that the *actions, passions, and effects,* denominated *internal, external, and medial,* constitute all *knowledge, existence, and sensation,* and comprise together the totality of the UNIVERSAL SYSTEM of the philosopher, for of nothing else can he have comprehension; and, on the other hand, it is evident that action, passion, and effect, are co-essential to the external, medial, and internal, or the existent, sentient, and conscient;* and these latter to each other, in strict *triunity.*

8. Such are the principles, or first conditions, which belong to these *universals* of the philosopher, knowledge and existence; and if we have truly developed them, they must belong also to the minutest particulars of his system. It is expedient, therefore, that we analyse *particulars,* that we may ascertain the particularity, and thereby confirm the *general* and *universal coincidence* of these principles.

SECTION III.

9. Again, therefore, the particulars of the universe are either those of knowledge, existence, or sensation. Take, then, for the purpose of this analysis, any *particular sensible thing,* (because such is the effect of the concurrence of *that-which-knows* and *that-which-exists* [6], and there-

* We beg this termination, for the sake of analogy.

fore involves with them the principles of all things), and abstract in thought, or separate therefrom every of its sensible qualities or powers —its colour, sound, shape, taste, &c. — there will still remain an existent something, that-which-exists, called substance, which is acknowledged by the mind, or consciousness, as a mere PASSIVITY.

10. Examine now the *sensible qualities* thus abstracted or separated, one by one, and further abstract them from the sensations had of them, and they will be no longer the sensible qualities of a substance, but will remain with, and be acknowledged by, consciousness, as mere ACTION.

11. From the latter abstraction or separation, a something yet remains which is not this *action*, but is a mere *passivity*, or sentient, in concurrence with which this action resided or arose, and is as such acknowledged by consciousness. But this passivity differs from that before mentioned [9], since consciousness places the first external to the mind, and the latter internal: the latter is therefore an INTERNAL PASSIVITY or sentient, and the former an EXTERNAL PASSIVITY or substance.

12. And both these *conceptions* of external and internal passivity are something distinct from *consciousness*, and all that remains to the mind: if, therefore, by a last effort of abstraction, we again separate or distinguish these conceptions from consciousness, consciousness regards itself as mere *action*, or existence; but this action differs from

that before named, for consciousness places the former external to the mind, and the latter internal; the latter is therefore an INTERNAL ACTIVITY, and the former an EXTERNAL ACTIVITY.

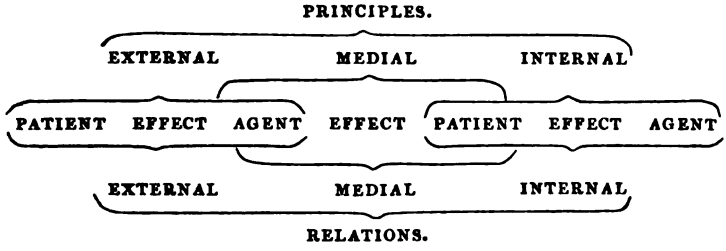
13. It appears clearly, therefore, that from the external action and passion the mind cognises effects which are denominated EXTERNAL SUBSISTENCES, or MATERIAL THINGS; that from the external action with the internal passivity the mind cognises a second class of effects, which it places neither internal nor external, but between the two, and which may therefore be denominated MEDIAL, or EFFECTS OF SENSATION; and that from the internal action and passion the mind cognises a third class of effects, which should be denominated INTERNAL or INTELLECTUAL SUBSISTENCES, or conceptions. Finally, action, passion, and effect, refer as *principles* or powers to existence; and the internal, external, and medial, to knowledge, as *relations*.

14. Thus it appears, also, that the same universal principles result from this particular analysis which before sprang from the universal [7]; that the *agencies*, *passivities* (or re-agencies), and *efficiencies* (or effects), of the *internal*, *external*, and *medial*, constitute all *knowledge*, *existence*, and *sensation*, and consequently are universal; while it is, as before, evident that action, passion, and effect, are co-essential to the external, internal,

and medial, and these latter to each other, in strict *triunity*.

SECTION IV.

15. This co-essential dependence of principles (or powers) and relations may be briefly represented thus:



16. Thus, it is apparent, that these first relations of knowledge are at once active and passive; that they may be considered in either respect; and that action and passion are correlative and inseparable terms—the latter signifying re-action, and the former implying suffering; they are therefore always coincident, and often convertible; and hence the necessity of *the analogical view* to correct inference, whenever we would philosophise concerning action, whether physical or moral.

CHAPTER II.

RELATIONS OF SCIENCE — MESOLOGY.

SECTION I.

17. AGAIN, from the beginning, a SYSTEM is a whole, consisting of parts or *principles* essentially *related,* or co-ordinate to some design or *purpose;* and such it is assumed, and will be granted, is the universe of the philosopher. [1, 3.]

18. If, then, *principles* and *purpose* be the co-essential extremes of his system, and he possess no power of transcending it [1], it appears to be through the medium of its *relations* alone that he can survey the universe with knowledge. An inquiry after the relations of the universal system is, therefore, the proper business of the philosopher, and the direct road to knowledge or SCIENCE.

19. Setting apart, therefore, the *principles* of the system, the science of which is properly called ONTOLOGY, being the science of elements and *Disciplines*—and setting apart, also, its *purposes,* and their science, TELEOLOGY, or the science of ends and *Arts* — we will first inquire concerning

its *relations*, the science of which may be called MESOLOGY, or the science of *Sciences*. According to which distribution, the whole of Learning is comprehended under Disciplines, Sciences, and Arts, and our first and chief inquiry concerns *the relations of science*, to which belongs the regulation of all knowledge.

20. The relations of the philosophic system, or of science, are either those of its *particulars*, of collections of particulars which afford *general* relations, or they are *universal* ultimate relations, which, comprehending the whole, must be the co-essentials of its synthesis, and also the final educts of its analysis.

21. Universally, then, the philosopher man, or *mind, as subject, the universe as object*, and philosophy, the *knowledge or view* which he takes of the latter, are the co-essentials of the philosophic system — the fewest relative parts of which it can be composed; * and as relations universally are the

* Of these three distinctions, involving *mind, matter, and discourse*, the two first are very ancient; such are the νοῦς νοητὸς, or seat, or *subject of intelligence* of the Greeks, as logically distinguished from the νοῦς νοητὸς, or *object of intelligence*; and the third is implied necessarily from the other two, as the νοῦς λόγος, reason, representation, or *view of intelligence*,[1] otherwise called wisdom, knowledge, and science.

The effects of the objects are *phenomena*; those of the subject, *noumena*; and those of the view are *analogia*, relations, or reasons.

[1] See Sydenham's Doctrine of Heraclitus, p. 39.

mean through which the philosopher perspects principles and purposes [17], so are they also that medium alone through which he can view his own subject, or the universe his object; — we may, therefore, defer also the consideration of the subject and the object while we investigate the view and relations of philosophy.

SECTION II.

22. Now, PHILOSOPHY in a universal sense, or the view which the philosopher takes of the universe, presupposes that it *exists* [4] — that it is *knowable* and *communicable* (for, presuming the universe to be a nonentity, unconceivable or incommunicable, involves a contradiction, annihilates philosophy, and terminates investigation altogether) —and that it should be knowable and communicable presupposes, also, *a system of relations*, or medium, by which such knowledge and communication can alone be possible [17].

23. The universe, therefore, exists according to a system of relations by which it is knowable and communicable to the philosopher; and this system of relations may, according to its position and reference, be called MESOLOGY, or the science of science, the subjective principle or ground of which is the *understanding*.

SECTION III.

24. If, again, there be philosophy, or *communicable knowledge,* there must be, also, a mode of *receiving* or knowing, and a mode of *conveying* or communicating such knowledge; and if the universe be thus a knowable and communicable system, the interpretation thereof will comprehend three subordinate systems; first, that which belongs objectively to the universal system itself, or *a mode or system of being,* or existing; secondly, that which belongs subjectively to the receiving or conceiving of it, or *a mode or system of receiving;* and, thirdly, that which belongs representatively to the conveying or communicating thereof, or *a mode or system of conveying;* and the two latter modes, or systems, must be analogous and correlative with the former, because they differ therefrom only as the receiving and conveying differ from the being received and conveyed — the one cannot be without the other; hence these systems comprehend each other under different views, and are co-essentially one, or *triune.*

25. The first of these views comprehends objective science, and refers to all things as existing, and may be called PHYSIOLOGY in its original and widest sense;* the second comprehends sub-

* The term *Physiology* was employed by the ancients to denote all natural science. By modern philosophers it is confined to that branch of medical science which investigates the vital functions of animal and vegetable beings only.

jective science, and refers to thoughts as known, and it is the science of receiving or acquiring knowledge and of the human mind, or NOOLOGY, or *Logic* in its widest sense; and the last of these views comprehends representative science, or the science of sensible signs, including letters, words, and language, and may, in an extended sense, be termed PHILOLOGY.

26. Each of these the philosopher necessarily presupposes as granted in some sense, ere he can proceed a single step in exhibiting or interpreting his system, since either being annulled, the others vanish; they are, therefore, co-essential to all discussion; and, if there be a defect in the one science or system, there will thence arise some deficiency in the other two.

27. If, hence, *perfect logic* and *perfect language* be essential to the acquiring and conveying of a *perfect system of knowledge*, or philosophy; and if both the former must depend also upon the proofs, progress, and perfection of the latter, it is clear that the philosopher must alternately improve his logic and language by his system, and his system by his logic and language, and each of these mutually by the others, since they are altogether reciprocally dependent or co-essential.

28. The minutest portion or particular of knowledge involves, therefore, *words*, *thoughts*, and *things*, in triune relation, and *man can but approach perfection in his knowledge as in his*

works, and this by an alternity which is infinite. Words, thoughts, and things, are also the necessary elements of all knowledge, and each of double reference — *subjective and objective* for words; *objective and representative* for thoughts; and *subjective and representative* for things.

29. This co-essentiality of the three elements of all discursive knowledge is apparent in many ways; for there can be no thought without an object or a sign or word, and words without thoughts or objects are empty, while objects without thoughts and signs are as nothing to the mind, and incommunicable. We have, therefore, a demonstration, or universal analogism, of the reciprocal dependence of the three to all effective *discourse*, whether in a logical or philological sense: accordingly, sane thinking is silent speaking, and sane speaking is thinking aloud.

SECTION IV.

30. We perceive, then, that the primary relations of universal science, thus synthetically viewed, coincide with the first principles of our previous analysis [7, 14], and that Physiology, as science, is objective, and of *external relation;* Noology is subjective, and of *internal relation;* and Philology is perspective or representative, and of *medial relation.*

31. Our process hitherto has, therefore, afforded the first principles and relations of the uni-

versal system of science or philosophy, of which *Physiology*, *Noology*, and *Philology* are co-equal genera, and mere counterparts or impressions of the same universal plan, in developing either of which the philosopher discovers no new object, but merely changes his position, or view, of the same universal system.

32. Accordingly, in the first of these views, we regard the universe objectively; in the second, subjectively; and, in the latter, perspectively or representatively: they are modes of comprehending or viewing only, and disclose not the *essence* of the universe, which, being the primary and absolute conditional of knowledge, must lie beyond its sphere, unknowable and incomprehensible. And here human reason is bound to do homage to ignorance, and acknowledge a being and dependence it cannot know.

33. Now, since the two latter plans are copies or impressions of the former, their developement is a subsequent business of the philosopher; meanwhile he is bound, in the first instance, to take logic and language as he finds them, because no otherwise could proceed his attempt to interpret that system with which they are co-essential or coincident.

34. It is expedient, therefore, that we postpone the further investigation of Noology and Philology, while we proceed in the developement of the physiological, or objective, branch of the system of know-

ledge or science: remarking only, that, in changing the view hereafter from *sciences*, or doctrines, to *disciplines*, the Mathematics take the objective station of Physiology, and, together with Noology and Philology, become disciplines; and, finally, that, in the view of art, Material art takes the relation of Physiology, and Logic and Philology become *arts*; — so that every distinction of knowledge may be regarded either as Science, Art, or Discipline.

CHAPTER III.

PHYSIOLOGICAL SCIENCE.

SECTION I.

35. THE preceding analysis of knowledge and existence [4, &c.] has taught us that the primary relations of science are what have been termed the external, internal, and medial, and that each of these by an appropriate action and passion is the basis of a peculiar class of effects, whence to each belongs a distinct science immediately subordinate to the universal; they are, therefore, the genera of all science, before denoted by the terms Physiology, Noology, and Philology.

SECTION II.

36. It has appeared, also [8], that the same principles and relations belong, likewise, to every particular of the system; and are thence guides to every department of science. Accordingly, Physiology, in its external relation, has a science which comprehends all *external* being, and therein all

material nature; and it is, therefore, called PHYSICS, or Natural philosophy.

37. Again, Physiology, in its internal relation, or view, has a science which comprehends all *internal* being, and therein all *moral* nature, and it is therefore called ETHICS, or Moral philosophy.

38. Between these, in its *medial* relation, Physiology has a science which comprehends objects which partake both of the internal and external, and connect physical with moral nature; it has, therefore, been called ESTHETICS, or the science of *sensible* objects, the media of communication between the external or material nature, and the internal, intellectual, or moral nature.

SECTION III.

39. *Physics, Esthetics,* and *Ethics,* appear hence to comprehend the first relations, or primary genera, of Physiological science; and, upon the foregoing principle of distribution [8], they have each three sub-genera, or species, according to the relations of the external, medial, and internal — it being the predominance of one or other of these relations which characterises and distinguishes each of the genera and species of science throughout the whole system of universal philosophy; for no science is *exclusively* external, medial, or internal; nor material, sensible, or moral (or whatever other denominations these relations may take under different views), but is only one or other of these

predominantly with some *subordination* of the other two.

40. It is the more necessary to keep this in view, that we may not run into confusion by making *relative or regulative* distinctions *absolute*, or by supposing that we err when we deduce all *three* of these relations from that which we have previously characterised by *one* of them, since we have shewn that these relations are universal, co-essential, and inseparable throughout science: they are, nevertheless, best distinguished in the higher genera — are more broken or less distinct in the lower species, but not totally extinguished, even in the individuals of science and of nature.

41. The primary genera of Physiological science being established, the secondary, or specific sciences, lie next in the order of analysis; and, as science universally has both an objective and subjective reference which are opposed, the external or Physical sciences are first and principal in the objective view, as the Moral or internal sciences would be in a subjective view.

SECTION IV.

42. First, then, PHYSICS, which comprehend, it appears, all external or material nature [34], have, according to our principles, three sciences, the first of which comprehends all that in external nature which is more purely *material or external;* and such is, in its most extended sense, CHEMISTRY,

or the science which comprehends the actions, passions, and effects of all *inorganic matter.*

43. Opposed to this, in physics, is a science which partakes of the *internal or intellectual* relation; and such, in its widest sense, is MEDICINE, animal science, or ZOONICS, which comprehends whatever is at once *material, organical, and vital.*

44. Between these, in physics, lies a third science, of a *medial* character, to which belongs all that in external nature which is at once *material and organical* only: it, therefore, comprehends all vegetal nature, and may, in an extreme sense, be termed BOTANY, vegetal science, or PHYTOLOGY.

45. *Chemistry, Botany,* and *Medicine* are, then, the three primary physical sciences, wherein there is a regular gradation from *inorganic* matter through the *organic* to the *vital* and sensitive: for there is no absolute division of genera and species in nature, nor of relations in science. Thus, it appears that the three genera of physics correspond to what has been termed the three kingdoms of nature — Chemistry, to the *mineral;* Botany, to the *vegetal;* and Medicine, to the *animal kingdom.*

SECTION V.

46. Again, ESTHETICS, the second and medial genus of physiological science, has three specific sciences of similar objective relations to the ex-

ternal, internal, and medial; and first, in more immediate relation to external nature, is PLASTICS, or the science of the symmetrical relations of *figures*, or the forms or shapes of external sense.

47. On the opposite extreme of esthetical science, and in nearer relation to the internal or intellectual, is HARMONICS, or the science of the symphonic relations of *sounds*, which belong to internal sense.

48. Between these, in medial relation, lie CHROMATICS, or the science of the systematic relations of *colours*, which belong to the intermediate sense of vision.

49. *Plastics*, *Chromatics*, and *Harmonics*, are thus the three primary sciences subordinate to Esthetics; and they comprehend objectively, in regular gradation, the medial department of physiological science in its reference to the internal, medial, and external, which are the primary relations of science universally.

SECTION VI.

50. Finally, there remains only the third, or internal genus of physiological science, ETHICS, which refer to intellectual and moral objects; and, like the preceding genera, are of three species, subordinated to the first relations of philosophy in the manner already pointed out.

51. First, in relation to external nature, is the

science of intellectual beings, *individually* or particularly; and such are MORALS in their particular sense, being the science of the relations and obligations of individual man or mind.

52. Secondly, in medial relation, is the science of intelligent beings *generally;* and such are POLITICS, or the science which teaches the relations and obligations of man, or minds, in community.

53. And, thirdly, in internal, or highest, intellectual relation, is the science of intellectual being *universally;* and such is religion, or THEOLOGY, which teaches the relations and obligations of the general and individual minds to the Universal, or of Man, or mind, universally, to God, the source of mind.

54. And these three sciences, Morals, Politics, and Theology, comprehend all *Ethical science;* and, together with the *Physical* and *Esthetical sciences*, complete the outline of Physiological, or objective science.

CHAPTER IV.

NOOLOGICAL SCIENCE.

SECTION I.

55. OPPOSED to, and correlative with, the physiological, or objective science, is the *Noological*, or subjective science, it being the science of receiving or acquiring knowledge [25] according to the various modes of thought; and, as the former science is of *external* bearing, so is this latter of *internal*, subject, nevertheless, to the analogy by which all science participates of the internal, external, and medial, according to certain predominances and subordination, whereby it is distinguished triply into genera and species [37].

SECTION II.

56. Now, the subject of *Noology* is the human mind, or internal; according to the faculties of which it is distributable as follows: — first, in external relation, as *memorative* or commemorative, it has the department, or science, of HISTORY, the matter of which is *fact*. History is,

therefore, the science of acquiring information or knowledge, or information by the mode or faculty of memory.

57. Secondly, in medial relation, as belonging to the *imagination*, it has the department, or science, of POETICS, the matter of which is figure and *fiction*; it is, therefore, the science of acquiring ideas, or knowledge, by the mode of *imagination* and invention.

58. And, thirdly, in internal relation, as belonging to *reason*, it has the department, or science, of DIALECTICS, or particular Logic, the matter of which is *eviction*, or truth, and may be defined the science of acquiring judgment or knowledge by the mode of reason or demonstration.

SECTION III.

59. Dialectics, Poetics, and Historics, are thus the three genera of Noological science, each of which is again subdivisible according to the same triple distribution; thus, in the relation of the *external*, we have NATURAL HISTORY, which corresponds to the whole field of physics, or Natural philosophy.

60. Opposed to which, in the relation of the *internal*, we have CIVIL HISTORY, which corresponds to the entire sphere of ethics, or Moral philosophy.

61. And, finally, between these, in *medial* relation, lies EXPERIMENTAL HISTORY, or the history

of experience, referring principally to the philosophy of sense.

62. Thus *Historics* are in species Natural, Experimental, and Civil; which species, though sufficiently distinguished and complete, are by no means independent of each other, but reciprocate in the manner of all knowledge, there being no *absolute* division in nature, nor distinction, but of *relation* in science.

SECTION IV.

63. Again, *Poetics* have a department in reference to the *internal*, which is RHETORICAL, or polyhymnic, the matter of which is words and thoughts, addressed to the mind through figurative language and sound. This is the science of Song.

64. Secondly, they have an *external* department, which is GRAPHICAL, and addresses the imagination through external sense materially; such is the poetry of the fine arts, of Painting, Sculpture, and Architecture.

65. And, finally, in *medial* relation, between these, Poetics are DRAMATICAL, and address the senses and imagination at once graphically and rhetorically.

66. Thus Poetics have three distinguishable species in their natural and artificial structure, the Rhetorical, the Dramatical, and the Graphical; each of which has a distinct science, alike distributable

in triple subordination, possessing at once a universal, general, and specific natures.

SECTION V.

67. By a like, and more intimate analogy, *Dialectics*, the remaining noological science, is of three species: first, in *external* relation, is the GENERALOGICAL species, comprehending the science, or logic, of induction, by which we argue from individua to genera; and it is principally of physical reference and empirical application.

68. Secondly, and *medially*, Dialectics are SYLLOGISTICAL, or belonging to the science, or logic, of syllogism, by which we argue through media to general and particular truths; and its reference and application are principally mathematical.

69. Dialectics are, finally, ANALOGICAL, comprehending the science, or logic, of analogy, which is principally of *internal* relation; and by it we argue from universals to generals and particulars. It is the mode of universal science; but refers, in a principal manner, to Ethical and Metaphysical science.

70. Thus, again, the Analogical, Syllogistical, and Generalogical sciences are subordinate species of the Noological genus of science, and complete the outline of the subjective department of science in correct correspondence with the objective, and

demonstrating the accordance, or systematic uniformity, of Noology and Philosophy universally.

71. Of the three branches of Noology—Dialectics, Poetics, and Historics—the first is principally of logical consideration; the two latter are connecting links of logic with philological science and literature, for none of the sciences are otherwise than relatively distinct.

CHAPTER V.

PHILOLOGICAL SCIENCE.

SECTION I.

72. THERE remains yet for distribution and analysis the *Philological*, or representative department of science, in intermediate relation to the *physiological*, or objective, and the *noological*, or subjective departments. It is the science of conveying and communicating knowledge, and therefore represents, and in a manner comprehends, all science, and the whole field of learning and literature [22, 31]; and is, in its widest sense, the science of signification, or Language.

73. As science, PHILOLOGY is, therefore, distributable in a triple respect, according to the preceding relations, into three subordinate, or specific sciences:—first, in *external* and material reference, are *letters*, or literary signs, which are the elements of Language, the science of which may be called SEMIOTICS, or the science of simple signs or signification.

SECTION II.

74. Secondly, in *medial* relation, which is principal in Philology, are *words*, which are significant of things, relations, and thoughts, and are the components of language, or discourse, and their science is properly called GRAMMAR, or the science of compound signs, or appellations.

SECTION III.

75. Finally, in *internal*, or intellectual relation, Philology has a science of enunciation, to which belongs the composition of words universally in the construction of *Sentences*, or propositions and discourse — and this is SYNTAXIS, or the science of enunciation, construction, and literary composition; which borders on, and has sometimes been treated as a part of, logical science on the one hand, and more commonly as a branch of grammar on the other.

76. SEMIOTICS, GRAMMAR, and SYNTAXIS, are, then, the genera of Philological science, which might be further subdistributed into species. As, however, they are commonly treated under one head, and their analysis would be attended by no apparent advantage, their subdivision is at present uncalled for.

SECTION IV.

77. Upon a review of the preceding analysis, it

appears that the progress and developement of science has been principally in an objective, or physiological view, which is its natural first step, since this branch of universal science is more immediately connected with the necessary habits and practices of mankind — the subjective and noological view being a refinement thereon, and more intimately theoretical and contemplative — while the progress of learning at all times, and among every distinguished people, has shewn that language, the instrument of knowledge, has been among the latest objects of their study and improvement. Hence, Philological science has been less completely developed, and has progressed last in the train of sciences.

78. Upon this circumstance hangs one of the principal difficulties attendant on an attempt to develope the sciences according to their true relations and distinctions; for, however perfectly this might be conceived, still, from the defectiveness of language, analogous and adequate accepted terms are wanting for effectively naming and conveying these distinctions. It is preferable, nevertheless, that we should use words and terms as we find them, or with such variation only as, being defined, cannot be misunderstood; because, notwithstanding it is easy to invent a nomenclature adapted to peculiarity of view, or novelty of system, still the difficulty is doubled when we have to attain unknown science by the medium of unknown

language. Neology is, accordingly, more commonly instrumental in disguising error, than in promulgating truth in science.

79. Syntaxis, the highest branch of Philology, comprehending the science of enunciation and chief office of language, becomes the connecting link of philology and logic, involving, in a measure, the rhetorical and medial branches of logic.

CHAPTER VI.

RELATIONS OF DISCIPLINES.—ONTOLOGY.

SECTION I.

80. HAVING analysed science in its principal, or middle branch, which we denote by the term *Mesology*, in which we have principally regarded the universal relations and source of science, we return to its correlative branches, distinguished by the terms *Ontology* and *Teleology*; the first of which is the science of elementary principles, the source of Disciplines, and the latter is the science of purposes or ends, the source of Arts.

81. Such, however, is the involution of science universally, that every branch thereof comprehends *principles*, *relations*, and *purpose*, in varied subordination, and is qualified for consideration in either or all of these respects, as *Discipline*, *Science*, or *Art*, although there is a natural specific affinity or predominance of one or other of them, to which each branch owes its distinction. Of these, the next for analysis is ONTOLOGY, the subjective principle of which is *Consciousness*.

82. The same rule of developement which has guided to the distinctions of mesological science conducts us also to the divisions of Ontology; and this is the principle of conformity which gives to science systematic unity, without which there could be no science of science itself.

SECTION II.

83. Accordingly, universal first principles are an *Agent* and *Patient*, and their concurrent, *Efficient*, or effect; and these are internal, external, and medial [15]. Hence Ontology comprehends three sciences, or orders of science; first, a science of *external principles*, or elements of material things, founded on the consciousness of an external substratum, or matter, the groundwork of Physics, of which latter we have already treated [34, 40, &c.]; and this branch of Ontology may be called HYPOPHYSICS.

SECTION III.

84. Ontology comprehends also a science of *internal* principles, elements of spiritual being, or intellectual essences, founded on the consciousness of self-existence, or an internal substratum, soul or spirit, the relations of which we have shewn under ethics; and this division of Ontology is, in common acceptation, called METAPHYSICS, but is more properly Hyperphysics.

SECTION IV.

85. Finally, it comprehends a *medial* science of principles, which lies between the material and intellectual, founded on the consciousness of the concurrence of an external and internal substrata, which order of science has therefore been expressively denominated the MATHEMATICS.

86. Hypophysics, Metaphysics, and the Mathematics, are, then, the first Ontological sciences, of which the third only remains for investigation and developement, the two former being referred to Physics and Ethics.

SECTION V.

87. Of the *Mathematics*, again, there are three principal divisions or sciences, according in relation with the external, internal, and medial; for, first in external or material reference is GEOMETRY, or the science of *space*, and its attributes, magnitude, figure, and passivity, or recipience, &c.

SECTION VI.

88. On the opposite extreme of mathematical science, and in more intimate relation to the internal or intellectual, is ARITHMETIC, or the science of *time*, and its attributes, number, activity, &c.

SECTION VII.

89. Between these, in medial relation, lie MECHANICS, or the science of *motion*, and its attributes, power, concurrence in action and re-action, time, and space, &c.

SECTION VIII.

90. Thus, Geometry, Arithmetic, and Mechanics, are the three genera of mathematical science; and, as principles are instruments, so are these sciences, as sciences of principles, *instrumental sciences or disciplines*, widely applicable, theoretically and practically, throughout science and art.*

91. They are accordingly distinguished into pure and applied. It is not expedient, however, that we here enter into the particulars and divisions of the mathematical sciences, it being our present design to shew their root and bearing only; it may, however, be remarked of the mathematics in general, that they are the science of power, grounded on the *absolute*, of which we can only have consciousness, and not science, while the mesological sciences are founded on *relation*; and the conclusions or demonstrations of the

* Hence, Pythagoras made the mathematics the foundation of his philosophy, regarding them as the way from things material and physical to that which is metaphysical and divine.

pure mathematics are accordingly absolute, or perfect.

SECTION IX.

92. Hypophysics and Metaphysics, the extreme ontological genera (as may be remarked also of Hypotechnics and Metatechnics, the extreme teleological genera), if they do not fall without the field of legitimate science altogether, are cognisable only through *hypothetical analogy;* and upon this ground only can be explained or made known, in the first of these genera, the *elements of matter,* the *essential principles of mind,* &c.; and, in the latter, the art of nature in *generation and production,* the art or *ends of Supreme Intelligence,* the ultimate *purpose of creation,* &c.

93. Man is therefore confined within a system of which hypophysical, metaphysical, hypotechnical, and metatechnical conditions are the boundary; in speculating beyond which, he is either a poet or a visionary, but not in any true sense a philosopher.

SECTION X.

94. Although the above-named are the principal branches of Ontology, and the mathematics are their chief discipline, yet any of the sciences or arts, employed ontologically, as principles administering and instrumental to other sciences and arts, become disciplines. Hence, the sciences of *Logic*

and *Philology* are eminent disciplines, and in close natural connexion and correlation with the *Mathematics*, in respective reference to words, thoughts, and things, which together comprise the ground of all knowledge.

CHAPTER VII.

RELATIONS OF ART.—TELEOLOGY.

SECTION I.

95. THE universe, in the view of nature, or being, consists of principles, whence ONTOLOGY; in the view of knowledge, or science, it is a universe of relations, whence MESOLOGY; and, as principles and relations are correlative with, and imply accordant end or purpose, if there be universal principles and relations of the universal system, there must be also universal corresponding Purposes, the science of which is TELEOLOGY, or Technology, the subjective principle of which is the will, or *Volition.*

96. And, as principles are chief in nature, or *being,* whence Disciplines and relations are chief in science, or *knowing,* whence Sciences, so purposes are principal in art, or *doing,* whence Arts; yet neither exclusively so — for principles, relations, and purposes, disciplines, sciences, and arts, are subordinate in each.

97. The preceding investigation of the universal

system has developed science in its Relations, and also as dependent upon Principles. It remains only, therefore, that we inquire into the science of Purposes, or TELEOLOGY, which is, in other terms, the science of art, or *Technics*, the plan and relations of which must coincide with those of science in general; since nature, art, and science, are but different views of the same universal system; and, accordingly, to every science there is a corresponding art.

98. Thus, art becomes the transcript of nature and science, and each reciprocally the antagonist of the other; nature and science as matter and form — science and art as theory and practice — and art and nature as ectype and archetype.

SECTION II.

99. Hence, the scheme of science universally is a sure guide in developing that of art universal, and their principle of distribution is the same; whence TECHNICS divide into external, or material art — medial, or sensible art — and internal, or intellectual art — as species; or *material art*, *fine art*, and *moral art*; which may be again subdivided in exact correspondence with the natural plan of all science — to every science its art, and to every doctrine its discipline.

SECTION III.

100. The two other genera of Teleology correlative with Technics are HYPOTECHNICS—the subject of which is the ends, or purposes of nature—and METATECHNICS, or Hypertechnics, which treat of Divine, or moral purpose. Thus, art in the abstract appears to be *natural, human, and Divine;* of which more hereafter, in a distinct treatise, or outline.

SECTION IV.

101. Notwithstanding principles and relations belong to Art, in common with Nature and Science, it is universal, ultimate purposes, which are principal in art. By purpose is here denoted the object or end of design; and as the object of all design is in the abstract *Good* (for even evil design bears in its purpose an imagined good to the designer*), and as all art also involves design, all art and purpose involve good, real or imaginary.

102. *Good,* accordant end, or harmony, is, then, the universal purpose of Art, and we have seen that it must correspond to our universal relations; there are, therefore, three kinds of good, or three purposes of art, and the universal system. Accordingly, all physical, material, or external

* Hence Milton has made Satan exclaim, "*Evil,* be thou my *Good!*"

good may be called *Beauty*, as denoting the end or purpose of all material art or design: all esthetical, sensible, or medial good may be called *Pleasure*, being the end or purpose of all sensible* art or design; and, finally, all ethical, intellectual, or internal good may be called *Happiness*, being the end, or purpose, of all intellectual design.

103. The first of these is synonymous with comeliness, accomplishedness, finishedness, sufficiency to an end, or *pulchritude;* the second, with gratification, the fulfilling of desire, or *plenitude;* and the last, with mental satisfaction, or *beatitude;* all of which are relative to their ends respectively, and are not absolute, but coincide in the chief end, and are grades of Good, the purpose or end of beauty being pleasure, and the true end of pleasure being happiness, or felicity.

SECTION V.

104. The above may suffice for the present, and terminate our abstract or outline of universal science and the system; keeping in view, however, that knowledge has three respects, according to which it is either instrumental, theoretical, or

* The term SENSUAL would be proper here, as analogous with *intellectual;* but having acquired a gross signification, the term *sensial* being analogous with *material*, might supply its place. We have, however, employed the current term, *sensible.*

practical: as instrumental, it is founded on principles, and affords *disciplines;* as theoretical, it is founded on relations, and affords doctrines, or *sciences;* and, as practical, it is founded on purposes, and affords *arts.* Every branch of knowledge has, therefore, its discipline, its science, and its art; and these terms are, under such limitation, convertible. Hence, Ontology is the source or science of Disciplines, as Mesology is of Sciences, and Teleology of Arts; and, according to this distribution, the following outlines are regulated and arranged in series.

CHAPTER VIII.

CONCLUSION AND SYNOPSIS.

SECTION I.

105. Upon the whole, it appears that the primary relations and constituent principles of the universal system, though distinguishable in name and conception, are in reality essentially united, each comprehending the others; by its analysis we acquire, therefore, only different views of the same universal object, alike in plan and relations, but varying in view and denomination.

106. Accordingly, in analysing either of the three primary relations, or departments, of science, we develope another triad of conceivably distinct, but really united parts, or correlations, and attain only more confined views of the system. And thus we may descend analytically from the universal through the general to the particular, still only contracting our view of the same object, or system, which is equally triune in the narrowest portions of matter, or particulars, as in the highest intellectual or Universal Being.

107. We conclude, therefore, that *the Universe is a system of systems in triune subordination;* and, since every system is a united variety of parts essentially related, and the fewest parts of which any system can be composed is three,* *Triunity is the simplest systematic form, and appears, therefore, to have been that according to which Universal Wisdom and Perfection has framed and frames the world.*†

108. Such is our system, and its characteristic is the universal harmony and necessary consonancy of its parts, none of which is capable of *absolute,* but only of *relative* distinction; so that, if our philosophy be conformable to nature and truth, *the Universe is an absolute unity, or whole, comprehending a relative infinity of parts* — A PERFECT SYSTEM.

109. All unfolding of the Universal System is, therefore, a violence done to its unity, and is attended by a degree of imperfection, or deficiency, that increases at every remove, and an ambiguity that is attendant on every change of terms;‡ our

* Of two parts there may be union, or a *Diastem,* but there can be no *System,* or interchange, or variety of union; consequently *three* are the fewest parts capable of *systematic unity.*

† An All-wise Being could not but choose the simplest sufficient plan, nor act without unity of design.

‡ Words and terms used principally for *distinction* have little indication of *relation;* they denote, therefore, the *differences,* but omit the *agreements,* of things; and this they do principally through want of analogy and relation one with another.

outline pretends not, therefore, to a perfect d
velopement, but only to have indicated a perfe
system, and the form of its developement.

SECTION II.

110. To render this indication more perspic
ous, and to illustrate the present and following o
lines, in which latter this universal regimen will
extended to the particulars of science, nature, a
art, the following SYNOPTICAL TABLE is subjoine
which exhibits, first, the root and ground of Scien
universally, or Philosophy, the effects of which a
Universal Sciences differing not in plan, but
place and relation, and disclosing in their ra
fications, according to the preceding analogic
deductions, the genera and species of science.

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111. To the universal sciences of this Table, and to their genera, substantive appellations have been given, but to their species attributive names have been assigned. The terminations in *ics* have been adopted to denote the generical reference of the former — and our principle of nomenclature throughout has been to preserve analogy, without innovating or violating needlessly the established language of philosophy.

112. In this Table, also, all knowledge is arranged in three principal columns, as *Disciplines, Sciences,* and *Arts,* subtended by their universal philosophic roots, or chief sciences, *Ontology, Mesology,* and *Teleology.* The central, and principal column, comprehends the Sciences succeeding each other in analytical series from the universal through the general to the special sciences, connected through language with *Literature,* which comprehends and terminates the whole.

113. Literature also extends to, and might be conjoined with, all the particular and accepted sciences, arts, and disciplines, individually; but he who well comprehends the relations of this Synopsis, will be at no loss in assigning to each of these its appropriate place, rank, and relation, in the universal system of science; as an aid toward which, however, we have prefixed to our second part a table of the mixed and established sciences, &c., based upon the natural arrangement of that before us.

114. In the present table the principal and dependent sciences succeed each other in *analytical series;* as, however, science is a *system* in which all the parts are correlative with the whole, it is neither a series, nor a plane, nor a circle, but a sphere: yet, since all literary communication is necessarily successive, the present plan has been preferred on the score of expedience and utility. Regarded *synthetically,* or inversely, from the particular through the general to the universal, our Synopsis is prosyllogistical, or a chain of dependent syllogisms.

115. In this table, also, knowledge is regarded principally with reference to its objects; nevertheless, it may be regarded subjectively, or with reference to the mind and its faculties: but this is the logical, and not the philosophical view. So identical, however, are these two views naturally, that, when perfectly developed, they will coalesce without confusion; but, in the present state of philosophical language, it is expedient to keep them apart. It is probable that Bacon was under an impression similar to the above when he constructed his celebrated table, from his having arranged the sciences and arts under the faculties of the mind.

116. Were this a proper place to enter upon the subject of the necessity and advantage of *intellectual education* to the progress and happiness of man, as a thing not less essential than bodily discipline and exercise are to his personal and social

well-being, we might enlarge upon the utility of such tables in denoting the fittest course of education appropriate to the individual, according to his powers, position, and prospects in life; but thus much may be allowable, in a general way, that to the bulk of mankind the *instrumental sciences* are of first and greatest importance, after the literary discipline of childhood, in which the powers of language in reading and writing are acquired — and these together include the whole of Philology, Logic, and the Mathematics. As to the rest of knowledge, the profession, class, and capacity of the individual, must determine the science, or art, which ought to be principal in his education, and their relations will point out what other studies are of secondary and subordinate importance; the entire investigation of which is well deserving of an especial treatise; but the main object of these tables is not the individual, but the universal — not so much the particulars and generals of science, as the whole encyclopædia of knowledge and practice.

We proceed, in the next place, to *Disciplines*, the subject of our second part, and the peculiar objects of education.

PART II.

DISCIPLINES.

PART II.

DISCIPLINES.

PROEM.

117. In the preceding part of our work we have treated of knowledge, universal science, or philosophy, as a *System;* in the outlines which follow, we regard the same as a *Series.* As, however, the philosophic universe is a whole, the relations of its parts are not strictly consecutive, but simultaneous and correlative; nor can they, therefore, be extended into series, without some detortion of their systematic unity and correlation; an imperfection which must inevitably attend the most perfect course possible of philosophical developement.

118. We preface this obvious truth in anticipation of any natural defect of system, or dissidence, that may be objected against the following outlines; not in defence, however, of such as may either belong to deficient knowledge, or to the discordance of established sciences; all of which circumstances are opposed to every system wherein the reconcilement of the sciences may be attempted.

119. These are, indeed, among the chief difficulties which have at all times kept philosophic systems and sciences asunder, to the utter reproach of all system, and the great impediment

of the *whole* of science; and there is not, perhaps, a surer test of the fallacy of any philosophic system than its incompetence to coalesce with, connect, and regulate the various natural branches of science; nor can preference be withheld from that system, the philosophy of which shall be most completely and universally applicable.

120. As to the system before us, the reader who may have comprehended the previous outline with conviction, will find little difficulty in pursuing its course through those which follow. In the former, we have delivered a brief outline of the analogical system universally; in those which follow, we proceed to a further developement of its genera and species, in more immediate reference to the established sciences, through the three chief classes of knowledge, *Disciplines*, *Sciences*, and *Arts;* the first of which regard the principles and instruments; the second, the relations and regulation; and the last, the practice and purposes of knowledge: the first being comprehended under Ontology, the second under Mesology, and the last under Teleology, which are the principal branches of Universal Philosophy.

121. Of the three chief Disciplines which constitute the subject of this second part, the first is *Philology*, or the science of language, which in natural connexion precedes *Logic*, which is the science of intellection generally, and of reason and ratio in particular, upon which are founded

the *Mathematics;* which latter term signifies disciplines, and has descended from Pythagoras, the father of disciplines, who held number to be the first principle of all things; and of these three branches of discipline we proceed to treat in successive outlines. Plato, in his Republic, after Pythagoras, has regarded music, or harmonics, as the chief discipline; and, in truth, it in some sense comprehends the other three. We pass it, however, having, according to our plan, treated of it as a branch of esthetical science.

122. These Disciplines are instrumental to the Sciences, as the Sciences are to the Arts; whence the order in which they precede and follow each other. It is to this the Disciplines owe their name, and that they are the proper foundation of all mental *Education,* and stand first in the series of science. Accordingly, Language and Arithmetic have been made the bases of the ordinary course of school education, under the denomination of Reading, Writing, and Accompts; and, as to the higher forms of a classical and collegiate education with regard to science, they do little more than extend them to the higher branches of *Philology,* the *Mathematics,* and a very inadequate *Logic.*

123. A correct and systematic determination of the number and relation of the chief Disciplines, will render apparent in what respects the usual education of youth is either injudicious or deficient; and a just philosophic view of knowledge

and instruction will set us right also as to the proper after-course of studying the Sciences and Arts; and, without renouncing the special application to any of these as introductory studies, it is nevertheless evident that they are properly, and in general secondary and subordinate, to the chief disciplines — as following, and not as leading studies, to the youthful and uninitiated.

124. The acts of acquiring and knowing — learning and knowledge, are simultaneous and coincident; hence, to learn any thing, it is necessary we should know something — the converse of which also is true; and, such is the admirable fecundity and connexion of science, that the more a man knows, the more he is qualified to learn, individually and socially.

125. That, before we can learn any thing, it is necessary we should know something, has been urged as a proof that knowledge is innate; but (without taking either side in a controversy which seems to be respecting the precedence of parallels only), the first impression of sense is the first affection of *consciousness;* the first distinguishing of such impressions, or reflection of consciousness, is the first cognition, or acquisition of knowledge, the first act of *understanding;* and the first preference or desire of such impressions, is the first *volition,* the first determination of will. Thus, the whole MIND becomes developed; and then, reciprocally, by *will* directs the *understanding* to the

objects of *consciousness*, or the acquisition of knowledge, &c.

126. Upon this is grounded the natural principle of all Education, the most important maxim of Tuition, and the just regulation of all Disciplines; for it may be regarded as a first law of discipline and education, *through the known, or acquired, to conduct the mind to the acquisition of the less known, and thence to that of the unknown;* and such is the true process of all *logical discipline*, all *literary discipline*, and all *mathematical discipline*.

127. This principle of education, which in *learning* or acquiring knowledge is theoretical, becomes practical in *teaching;* and thereon is founded inversely the rationale of the modern practice of tuition by Bell and Lancaster, whereby the *untaught* mind is disciplined and instructed by the mind *little-taught*, and the lattter receives tuition from the *more-taught*, and so on upward to the master-mind and Tutor initiated in all Disciplines.

128. The Disciplines, then, precede the Sciences, as knowledge precedes practice, or science precedes art; and, with respect to the faculties of the mind, disciplines depend upon consciousness, as science belongs to understanding, and as art is grounded upon will.

129. And here, again, the proper course of intellectual education in the individual appears to begin with consciousness, to proceed through understanding, and to terminate in will; not ex-

clusively of either, indeed, but in subordination throughout; and this subordination of the intellectual faculties is to be particularly inculcated in both the tutor and pupil, as the most important maxim of right education.

130. In the highest of all respects, man must be *disciplined* or taught, according to the Delphic oracle, to *know himself:* and having attained this master *science,* he must accommodate his practice or *art* to this knowledge, ere his nature, individual or social, can advance materially or morally.

131. Hence, it is by all admitted that disciplines and education are essential to the establishing of right habits; for the untaught, being undisciplined, either act erroneously or are unable to act; and it is only by a teacher or instructor who is already disciplined that right habit or instruction can be conveyed or established. It is therefore evident, that it is the ungracious task of the Master to correct, to reprove, and to admonish, for by no other means can he instruct; and hence, he is called a monitor and mentor, from *mens,* mind; and *to mind* is the reciprocal office of tutor and pupil: of the latter, in applying the precepts of the former, who is thence also called a preceptor.

132. And, as to the best course of instruction, it is the natural course of knowledge, as a series, in which disciplines precede sciences, and sciences precede arts; and, as language comes first, logic, as the science of thought, ought to follow it, in

precedence of the higher mathematics, not absolutely, but simultaneously, in subordination. The mind, thus prepared by discipline, may then enter on the sciences, in which the physical precede the sensible, and the moral, or ethical; after which the whole field of art and practice becomes of easy and right acquisition.

133. The discipline, or education of the young mind, here adverted to, is that of passive intellect, or *understanding*, which regards the acquisition of knowledge, with which our present inquiry is principally concerned; but there remains the coequal discipline of active intellect, or *Will*, which should accompany the former, to which it is eminently conducive, while it is even more essential to well-being than knowledge itself. In this discipline of will, or active intellect, the mind of the pupil must also follow that of the preceptor; and it is in such a course that discipline makes eminent scholars, as well as good men and good soldiers.

134. That subordination, too, which we have prescribed to the whole mind, should be more especially extended to the Understanding, so as that its higher and more intellectual faculties be not sacrificed to the inferior; but, by a due exercise of each as they arise, to invigorate them for mutual support, and the relative perfection of the whole, according to the intention of nature, wherein memory precedes imagination, and imagination precedes reason: whence, also, it follows, that

infancy is the proper period of life for the acquisition of languages, and that these have been too long deferred when the organs of the voice and the faculties of thought have become matured.

135. Learning adapts itself to the state of society; and no man seeks knowledge, or studies, but with reference to his fellow-men: it follows, that ignorance, in the bulk of mankind, retards the progress of genius and ability in the highest and most distinguished of ranks and individuals.

136. There is hence a reciprocal action and reaction between the individual mind and society, which render the cultivation and education of all ranks essential to their mutual advancement and the progress of the whole: for the higher the object is the higher will be the aim, and the more exalted the achievement in all disciplines, whether they be material, mental, or moral.

137. Hence education is the interest of all, and the better the materials and the workmen are, the better will be the produce of his art. When, therefore, the common mind has attained the station of the learned, the genius of mankind will assume for learning a higher station, till the summit of knowledge and instruction shall be attained. Man, therefore, should not be educated for himself individually, nor wholly for an artificial state of society, but with a view to his universal relation and end.

138. We have remarked, in another place, that

the great end of creation is the developement of intellect. To this all nature is subordinated. We need not ask, therefore, What ought to be the chief endeavour of man? nor, What is the highest object of education throughout? for all should be subservient to intellect—subordinate to God.

139. So much indicatively for *education*, which belongs incidentally only to our present subject, but which, for interest and importance, is among the first of human inquiries, and not to be overlooked in a work devoted to science, as a whole comprehending every object of instruction. And as the first of our acquirements, and the groundwork of all education is language, the science of which is *Philology*, the first of the disciplines, and first in the natural series of the sciences, we proceed thereto, premising only a tabular view of such series, founded upon the preceding *Synopsis*, in correspondence with the mixed sciences, for the purpose of illustration and reference.

140. We have stated that there are two ways of regarding the sciences as a whole — the one *simultaneous or in system*, by correlation, logically; the other *consecutive or in series*, by concatenation, according to precedence, chronologically; not that the literary representation of either can be purely either the one or the other, but only by predominance; we have, accordingly, treated of the sciences in our first outline *in system successively*,

and, in the outlines which follow, we have tre
of them *in succession systematically.*

141. The first of these we have illustrated b
plan, or *Synopsis* [109], and in the latter view
have, in the annexed *Table,* exhibited the fun
mental series of sciences, as a basis for the mi
sciences, or of the chief of those sciences wh
have obtained " a (literary) habitation and a nam
In this table the Fundamental sciences, &c., u
the basis of Philosophy, succeed each other
natural series at right angles with the columns
Mixed sciences, &c., which are alphabetically
ranged, so that every individual science may
referred to, under its initial letter, in juxtaposit
with the original science on its left hand, to wh
it is principally related, or from which it is chie
derived.

142. By this arrangement we have been enabl
to bring into some sort of systematic connexion t
chief of the desultory multitude of sciences a
arts with which literature abounds. The plan h
this advantage, also, that any of the denominatio
of science which have principal reference to seve
roots in the natural series may be denoted b
numerals, and repeated as often as required und
the same letter,—while any science, having vario
denominations, will appear under the initial of ea
connected by a dotted line, running horizonta
across the columns; but the various properties

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this plan, and the simple and natural manner in which it associates the Arts, Sciences, and Disciplines, will become apparent upon inspection of the table itself.

143. We are far from pretending, notwithstanding, that it contains either a complete list, or a perfect classification of the sciences, &c., so called; for not only does literature abound with sciences and doctrines without names, but it has also names of sciences without science; while the subjects of real or possible sciences are numberless; and all the sciences of literature have also their subordinate and individual sciences, as branches, although their denominations are not received into general literature; nor do we contend for the positions of their principals in our list, nor claim for all its appellations the title of sciences, &c.

144. Thus, MEDICAL SCIENCE has many subordinates not enumerated in the present table, such as *Ætiology, Symptomatology,* &c. Again, Surgery is Curative and Anatomical, of which the first branch comprehends Arteriotomy, Phlebotomy, Bronchotomy, Cystomaty, or Lythotomy; and the latter branch is divided into Osteology, which comprehends *Osteogony, Osteography* and *Synostrology,* and Sarcology, which comprehends Myology and Adenography, Splanchnology and Angiology; which latter is again divided into *Neu-*

rology, Arteriology, and *Phlebotology,* &c. It is the same with ASTRONOMICAL SCIENCE, which has been divided into *Astrography, Planetography,* and *Cometography;* under which come *Heliography, Selenography,* and *Meteorography;* and in this way most of the sciences have, or are subject to have, innumerable subdivisions, or subordinate sciences, which often assume triadic distributions.

145. Hence all the attempts at a perfect arrangement, or even a complete enumeration of the sciences, from that of Bacon inclusively, have failed in these respects. The utility of such Plans is, nevertheless, generally acknowleged, and their design is accomplished when they exhibit the divisions of science and distributions of the mind, as maps and charts set forth the divisions, positions, and outlines of countries, in both which there will ever be sufficient left unaccomplished for the attention and surveys of future inquirers; and if the latter be instrumental to a just knowledge of the Earth, how much more so may the former be to a right understanding of the world of Intellect and Science?

146. The present plan and table are fully adequate, however, to the purpose of general reference, on the score of simplicity, perspicuity, and the facility with which the relations and connexion of any particular science, &c., with universal

science, may be found through its denomination, under its initial, and tracing its root by its line upon the left; while its degree of relation to every other science, &c., will appear according to its proximity or remoteness on the table, which is open to extension and improvement.

OUTLINE II.

PHILOLOGY:

OR,

THE ANALOGY OF LANGUAGE

INDICATED.

PHILOLOGY:

OR,

THE ANALOGY OF LANGUAGE.

INTRODUCTION.

147. As we have delivered our universal system in a philosophical, or *objective* view, in the foregoing Outline, we proceed, in the following short outline of Philology, to develope the *representative* view, as introductive to the logical, or *subjective* view, which succeeds it. Our three first outlines may, therefore, serve to unfold the universal relations of words, thoughts, and things analogically, sufficiently for a ground to the general and special developement of the sciences which follow.

148. In the present outline we again embark upon an ocean which inspheres the whole world,—not of nature alone, but of art, science, and discipline; nor is it confined to the system of reality and truth only, but extends to things the most fictitious and arbitrary, and, grasping time

and space, connects the present with the future and the past, while it is the medium of commerce and communication between men and nations, conveying precepts to the unborn, and bearing instructions from the dead.

149. It is by thus uniting men and ages, that language has given to man the highest station among created beings; but for which he had remained, to the end of time, one only among the beasts of the earth: through the instrumentality of language, however, all the faculties of the individual are extended, the species becomes a great individual, and man a communicant with God.

150. Such are the powers and capacity of language, which is, at the same time, that department of the system of man wherein he exercises his faculties most diversely with least of the aid of nature and science, which are the same for all men; while language varies not only with nations and communities, but with parties, with individuals, and even with times, occasions, and modes of expressions.

151. It is hence that language has the first claim upon the attention of mankind, and that whatever, in the progress of philology, brings language nearer to universality, brings it nearer to science and truth, which are its objects: nor is this unimportant to the happiness of mankind, since nations will think more alike when they think in similar language, and will better understand

each other, and more readily communicate every good, as members of one family, under the same father, and not regard each other as alien, foreign, or barbarian.

152. If these remarks appear exuberant, they are meant to shew the magnitude and perplexity of our subject, and how difficult it must be to attain satisfactorily the true natural relations and references of a topic so wonderfully comprehensive, fluctuating, and diversified: for which, also, the superabundance of literary matter is rather a hinderance than a help.

153. It is true, nevertheless, that the genius of many eminent grammarians has tended, with a philosophic spirit, toward the universal principles of language, so far as regards the grammar of written speech, and therein they afford us some aid; but this extends to a small portion only of the entire system of representation, which goes to every possible mode and manner of communicating knowledge, and embraces the system of philosophy and science universally, which, in its turn, can alone conduct us to the true relations and outline of philology, or the genuine ground of signification, and the true analogy of language.

154. As so wide an investigation lies, however, beyond the commonly acknowledged bounds of this subject, and far exceeds the line of mere utility, a very brief outline may here suffice for evincing this universal philosophic connexion, and

for bringing our subject into bearing with the general analogy of language upon the legitimate foundation of nature, so as to afford, at the same time, the widest possible basis of utility.

155. We shall not need, therefore, to enter into the voluminous particulars and endless discussions of the learned in languages, nor very widely into the inductions of the universal grammarians, philologists, ethnologists, and etymologists; for these are but branches and foliage to the tree of which we seek the root. The comparative ease, however, of tracing these ramifications, their apparent fruitfulness, and the facility with which they have conducted to literary reputation and academic honours, may have been the temptations to which we owe the bulk of philology, and the preference the learned have shewn for this study to the neglect of logic and philosophy; although with little effect, so far, at least, as regards its foundation as a science: while it is to be regretted that *learning*, in particular, has been reduced to mere *lingual*, symbolical, and philological attainment in the study of the least instructive portion of the Greek and Roman classics; thus preferring, as it were, a dwelling in ancient ruins, to the laying of solid foundations, and building of noble structures, for her own abode.

156. It adds to these temptations which learning has to found philology upon *words* alone, independently of *thoughts* and *things* — upon sense

rather than upon reasons, on the one hand, or nature on the other; or, in other words, to trace *signification*, not logically or philosophically through understanding, but rather through sense, by the very uncertain and opposite process of etymologies and traditions — that it admits a flattering and ostentatious display of erudition which astounds, if it does not instruct; while the rational process terminates in naked simplicity, and demands a degree and kind of intellectual exertion and attention both in the conception and reception, to which the mind is but too often repugnant.

157. We dispute not, however, the benefits which arise from the labours of the etymologists and grammarians, so far as they may coincide with, elucidate, and confirm, the aim of philosophy. Etymology gives stability to language by disclosing the sources of words, and it does more so by pointing out their relations; but, in seeking their originals, pedantry has often employed false and too remote derivations, and substituted similitudes of sound for analogies of sense. The source of a word is of much less importance than its relations and signification, and is of secondary concern, therefore, even with the etymologist, with whom that which illustrates the latter is to be preferred to that which explicates the former, and that which is nearer is preferable to that which is remote, or beyond the compass or usage of the language itself.

158. Yet little has been done systematically by the learned to afford a truly philosophic form of philology according to the aim of our outline, which may, nevertheless, contribute somewhat to this end, and serve as a necessary introduction to our logic in accordance with the ancient synthetic method, which founds syllogisms upon words and sentences, and philosophy upon logic in the order of words, thoughts, and things; a method probably resorted to upon the consideration that words which are last in philosophical analysis are first in the communication of thought or knowledge,—it is, accordingly, the method of *Discipline*, and therefore we have adopted it in this place.

159. But we regard the analytical method as most truly scientific, doctrinal, and perspicuous, while the method of synthesis belongs to art and practical discipline, and is necessarily laborious and obscure. Well, therefore, might Aristotle, who followed this method, assure his pupil, Alexander, that he had published, and not published, his doctrines, veiled, as they were, by synthesis; from which the scholastics of after times never emerged, although there arose among them, like sparks amid smoke, disciples of extraordinary brightness, who kept alive the smothered fire of philosophy.

160. By neither of these methods can we hope to clear comprehension from all obscurity in a thing of such utter confusion and diversity as language and literature, and may be well content

if we can open a way, or throw a new light thereon, which may assist us in conducting the inquiries of philosophy.

161. In the communication of knowledge, words precede; and hence it is that, in logical and mathematical disciplines, definition precedes argument, and argument precedes demonstration; while logic is inseparable from philology, as thoughts are from words; accordingly, the Greek term, λογός (logos), from which they are derived, justly and philosophically signifies both word and thought; as, in like manner, *discourse* and *discursive* denote reasoning, speech, and communication, and have both a logical and philological import.

162. *Philology*, therefore, presents itself first in the series of the sciences as the first Discipline, and the instrument of *Logic*, as logic is of the *Mathematics*, and the three together are of all knowledge, whether it be of science or of art: Philology is, therefore, placed first in the order of the following outlines.

163. This is also the order of nature and of education, memory being the faculty of the mind which is first disclosed, and that upon which depends the acquisition of language; which, again, is the first subject of education, and that upon which all knowledge is dependent. Neither of them ought, however, to be cultivated at the expense of the higher functions of the mind, as

they are in ordinary education, since the understanding is strictly a *capacity*, which, being surcharged with these stores of memory, becomes incapacitated for other and more important acquisitions; nor is ever any human faculty unduly cultivated, but with a proportionate sacrifice of the rest.

164. As the purpose of the ensuing sketch is chiefly concerned with the form of philology in relation to universal science, we need not enter into the history and ethnography of language and the various stages of literary progress and invention. That the first characters employed in written language were *hieroglyphics*, or picture language, which represent objects by their figures and colours, there can be little doubt, and it is confirmed by historical testimony; and that *letters*, which characterize sounds, and are of general signification by compact, were of later invention, and gave the first scientific form to language and literature, is of as little doubt.

165. In the construction and composition of language, we have also the same ground to infer that Poetry, which merely figures or *symbolizes* knowledge, is more ancient than Prose, which *literalizes* it; the first in each case aggregates, concretes, and particularizes; the latter distribute, abstract, and generalize: hence the former of each is more technical, the latter more scientific

and philosophical, but the first are here only of incidental inquiry. Nevertheless, whether language were the result of a natural progress, or a divine communication, are questions we leave to the determination of ethnographers and divines; although we are assured by sacred writ that "whatsoever Adam called every *living creature*, that was the name thereof."

CHAPTER I.

PHILOLOGY.

166. It has been shewn that knowledge universal implies a universal mode of being, or *physiological science* — a universal mode of receiving, or *logical science* — and a universal mode of conveying, or *philological science;* the first referring to the matter and *object* — the second, to the form and *subject* — and the last, to the *representation,* sign, or interpretation of knowledge, or the medium by which the mind, or subject, receives and conveys knowledge, or thought.

167. As the subject is of *internal,* or intrinsic reference, and the object is of *external,* or extrinsic reference, so is the representation of *medial,* or intermediate reference; and the latter is thence principally related to sense, as distinguished from matter and intelligence. Accordingly, sense supplies the representing medium and *signs* of all knowledge of *things* which are the objects of physiology, and of *thoughts* which belong to the logical subject; it has, therefore, a triple reference — subjective, objective, and representative.

168. As the elements of physiology and logic are powers and faculties, so are those of philology; and such are the senses, as limited with regard to knowledge; of which senses *feeling* is the genus, and *touch, sight,* and *sound* are the species; which, as respects philology, or the mode or means of conveying knowledge, are efficient of all language or philological operation.

169. Strictly speaking, therefore, every sensation is but the sign of the thing it represents; so that *sensation is the natural universal language of sensible beings, by which knowledge is received and communicated;* and, as knowledge is communicated artificially and conventionally only by *figures,* or characters, and *sounds;* and figure, though immediately belonging to touch, is mediately cognisable by the sense of sight; the language of art refers but to the two senses of sight and sound.

170. And since the arbitrary language of art is that of the first conveyance of philosophic knowledge, we may pass by the remainder of the infinite field of philological science, wherein every sense may be rendered significant of thoughts and things, as it is also capable of representing, interpreting, and conveying all knowledge.

171. It is to the reciprocation and similitude of the parts of the universal system, so noticeable and evident throughout, that each sense owes its power of representing and conveying the entire system of knowledge; hence, we have

entire languages of sound, or *articulate language;* and corresponding language of figures, or characters, or *written language,* which is silent; and we have these also united.

172. According to the same reciprocation, or conformation, the various powers of each distinct sense are also capable of constituting distinct languages; hence colour, which belongs to sight, forms no part of written language; and note, or music, which belongs to sound, has no necessary connexion with speech; yet languages might be constructed of note and colour, as they are constituted to the dumb, and in the mimes of the antients, and modern pantomimes, by motion and gesture, which add, indeed, much signification to all speech; nay, both reason and authority go to prove the possibility of tangible, and even gustatory and olfactory languages;* to say nothing of the languages of signals and machines.

173. And since there is a natural constitution of figure and sound, which is of universal relation and analogy, and of unbounded scope, there is a perfect *natural constitution of figurate characters and articulate sounds,* and a capability or potentiality for a boundless variety of artificial characters and speech; and from hence springs the variety of languages.

* See Smith's Optics, Vol. II.; Remarks of Dr. Jurin, p. 29; Marquess of Worcester's Century of Inventions; Bp. Berkeley; Bp. Wilkins, &c.

174. To this variability of language may be attributed that chief cause of philosophic instability and controversy which lies in the fluctuation, confusion, and imperfections of artificial language, of which it is our present business to trace the natural and scientific relations, and to reconcile, in particular, with the system of logic.

175. Language, then, as *spoken* and *written*, refers to *sounds* and *characters*, as above limited, and also as coinciding with each other, or uniting in signification. Characters and sounds are, therefore, the elements of artificial languages; and to the last of these belongs the Orthoëpy of speech, and to the first the Orthography of written language.

176. The Egyptian hieroglyph, or symbol of speech or language, is said to have been a *tongue*, with an *eye* and a *hand* placed beneath it; and it has been variously interpreted:—"That the eye, as being most expressive, next to the tongue, was put beneath it, and the hand added, as executing its orders;" "that the eye and hand were placed with the tongue in this symbol, on account of their powers in oratory," &c. Be these as they may, this hieroglyph of the Egyptians appears to be a most expressive symbol of language, as *spoken* by the tongue, *read* by the eye, and *written* by the hand.

177. In the simplest combination of characters with sounds, they constitute *Letters*, which are

the elements of *Words*, or names of thoughts and things; of which *Sentences*, or propositions, and all language, are composed. And this agrees with and confirms the sub-genera or species of *Philology*, of which we have before indicated the position and universal relations, namely, *Semiotics*, which treat of literal signs, or letters; *Grammatics*, which treat of names and words; and *Syntaxics*, which treat of enunciation and discourse: of which three, the first regard the elementary *principles* of speech; the second, the *relations* of words; and the last regard the *purposes*, or chief objects of discourse; and of these we proceed to treat in succession.

CHAPTER II.

SEMIOTICS.

SECTION I.

178. SIGNS, or characters, which are the subject of SEMIOTICS, are of three kinds: *vocal*, or letters; *mute*, rests or points, between which are *semi-vocal* emphatic signs or *accents*; and these divide Semiotics into *Literation*, *Punctuation*, and *Accentuation*, of which the first is principal, and the others subordinate. First, therefore, of letters, or alphabetical characters.

179. Letters are not only oral and visual, as distinguished by sounds, or figures and characters, or by both these united, according as they are spoken, written, or read; but they are also distinguished as *vowels*, *consonants*, and *diphthongs*, or polythongs; although all letters are, more or less, vocal or vowel sounds.

180. We will consider them, first, as vocal sounds, and afterwards as visual, or figurate characters, in both of which there are still some relation and connexion discoverable between nature

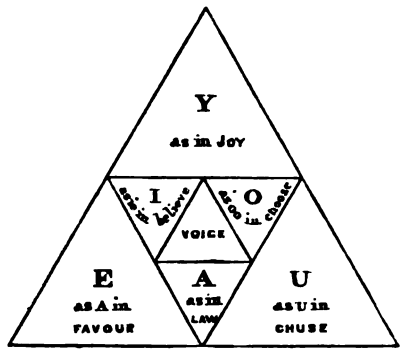
and art in the practice of language; to trace and develope which become necessary, ere language can be founded on science.

181. Of *literate sounds*, the vowels are most truly vocal, as their name expresses; they are, therefore, the principal of alphabetical sounds, and are chiefly distinguishable as monothongs, diphthongs, and triphthongs. Imperfect and unsettled as the pronunciation of the vowels are, we may still trace a musical analogy among them; thus, in pronouncing the vowels in the usual manner, and in the following order, E, I, U, O, A, we find the organs of articulation adapt themselves to a descending vocal scale, or musical series: perhaps, therefore, if nature had been strictly followed, the primary vowels, &c., would have taken relations similar to those of the common chord and consonances of the diatonic, or natural scale of music; while the Consonants (which are aptly named), and Diphthongs and Triphthongs, or double and triple sounds, are but combinations, modifications, or intermediates of the vowels, in similar musical analogy.

182. The *Vowels* I, O, A, in their genuine original sounds, corresponding in relation, although not in interval, to the notes G, E, C, of the musical scale, would then be the primary alphabetical sounds; the relations of which to their secondaries, E, Y, U, may be thus represented: first, among the vowels, as *primary*, in the central triangles; and, finally, as *secondary*, in the three extreme

triangles, which enclose them in the following figure.

Fig. 2.



And it is worthy of remark respecting these elements of speech, that although the Greeks, who refined upon every thing, employed the secondary vowels, their African neighbours acknowledged only the three primary.

183. To this representation of the powers of the genuine vowel sounds, as elements of language, which appear to have been much impaired in their modern pronunciation, some authorities may be necessary; and although a great number might be cited, the two following will be deemed sufficient. Parsons, in his "Remains of Japhet," p. 413, treating of the ancient Magogian and Gomerian alphabet, used by the ancient Britons and Irish, remarks, "The vowels are thus pronounced: *a* as *aw*, in *law*; the *e* as *ay*, in *way*; the *i* as ee,

in *weed;* the *o* open, as in most languages; the *u* as *oo*, in *wood.*" "You know," says Socrates, in the Cratylus of Plato, "that our ancestors very frequently used the ῑ (and ϳ); but now, instead of the ῑ, they perversely use either the ε̄ or η̄, (and ξ instead of ϳ)." Socrates alludes here to the antient Cadmean alphabet in which the *i* answered to the Hebrew or Phœnician *jod*, and the E was sounded like the bleat of a sheep, as we now improperly pronounce the A in English. The O of the same alphabet, whether long or short, had but this one character, and corresponded to the Hebrew and Phœnician *oin.*

184. The secondary vowels, E, Y, and U, are double vocal sounds, or *diphthongs*, when they assume not the simple power of the primary vowels. This is evinced with regard to U, when it is the initial of any word preceded by the indefinite article *a* (which, according to the rule, should become *an* before a vowel); thus: a united; a useful; a universal, &c.; before either of which, in spite of the rule, the ear can hardly endure the *an*, any more than it can the article *a* before either of the vowels *i*, *o*, or *a*, as any musical ear will allow, although, by custom and habit, the ear will tolerate any cacophony; and Y is allowed to be as frequently a consonant as a vowel.

185. These remarks apply also, in some cases, to the primary vowels; thus, in the word *one* the *o* is a dipthong, or consonant, equivalent to *w*, and

the ear can hardly tolerate the regular article preceding it; hence, to an unprejudiced ear, *such a one* is preferable to *such an one.*

186. Grammarians, by rendering their rules universal contrarily to natural usage, though they seem to refine a language, and render it more regular, learned, and scientific, destroy its melody; and it is to the exceptions, or temperament of rules, with a correct knowledge thereof, that many of the graces of a proficient practice in every art belong; and as we have no invariable vowels, so we cannot justly govern them by invariable rules.

187. Upon the same principle, *a* should become *an* before any word which begins with a silent consonant preceding a vowel; thus, before a silent *h*, as *an hour*, &c.; although the *an* is sometimes employed in robbing us of our aspirate. A correct ear will, however, guide us aright in all such cases of euphony; and our indefinite article, assisted by the ear, is an infallible test for determining whether any letter it precedes is sounded as a vowel or a consonant, except, indeed, such letter stand alone: for, in such case, every vocal consonant, including the liquids, will require *an* before it. For example, *an F, an H, L, M, N, R, S,* and *an X;* but all the mutes will, in the same case, require the *a* prefixed; thus: *a B, a C, D, G, K, P, Q, T, V, W, Y,* and *a Z.*

188. It appears, therefore, that there are letters which are *intermediates* of the *vowel* and *consonant,*

although, in strictness, there are neither absolutely mute consonants nor perfectly vocal vowels; but every letter partakes of the vocal and the mute, as musical sounds partake of sound and silence, acuteness and gravity, as their extreme principles.

189. Accordingly, the vocal relations of the consonants, &c., to the three primary vowels, may be traced throughout our alphabet, as in the following table:

ALPHABET.

Vowels.	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	V	W	X	Y	Z	
I, ĕ, or ĭ .	be	ce	de	ea	ef	ge	.....	...	el	em	en	pe	..	....	es	te	ve	..	ex	..	zed		Labial.
O, oo, or u	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	kou	.....	.....	.....	.....	ou	..	oui	..		Palatic.
A	.....	.....	.....	.....	.....	ach	ja	ka	..	.....	.....	.....	.....	ar	....	.....	.....	.....	.....	.....	.....		Guttural.

These, as sounded near the lips, within the mouth, or at the throat, are *labial*, *palatic*, or *guttural*, in the order of the vowels I, O, A; or, as intermediate to these, they are *dental* or *nasal* articulations.

190. When it happens that a consonant in any word is not sounded, the vowel to which it owes its sound may be put in its pl[illegible] the consonant G being silent in [illegible] foreign, cognisant, paradigm, &c[illegible] ituted by its vowel E; thus [illegible] nisant, paradiem, &c.; or the [illegible] ly modified, without affecting [illegible], although [illegible] ted by custom [illegible] even different

provinces and individuals of the same nations, articulate and sound these elements of language variously, there can be no certainty, but only probability, from the most cogent argument possible concerning things so indeterminate and variable as articulate sounds.

192. After the sound of letters, as articulate or vocal, come for consideration their figurate characters, as graphic, or visual. Now, the earliest attempt at literary or graphic communication, or writing, seems to have been by the figures of particular things, or *pictural representations*, as among the aboriginal Mexicans. The *hieroglyphs* of the antient Egyptians were intermediates of such representations, and the more general symbols of the Chinese; and the next step from these *symbols of words* being to universal signs, afforded letters.

193. Thus, the natural progress of written language is a generalising process, from symbols of particular things to symbols of general signs, words, and thoughts; and thence to symbols of sounds, or univ[illegible]alphabetical signs, of which we have at-[illegible]e analysis. Thus the philological and [illegible]l progress of man from particulars to [illegible], from the segregate to the abstract, are

[illegible]ing letters, then, as visual, namely, [illegible]or figurate characters, there should [illegible]nd science a foundation for them [illegible]matic as for their vocal sounds, for

they are geometrical forms or figures, which have elements also in the same respects as sounds have; and though there may seem less connexion between natural forms and the figures of letters than there is between natural and artificial sounds, yet it is a remarkable coincidence with our view that the three primary vowels in the Magogian, and other antient languages,* as well as in the Grecian and Roman characters, I, O, A, are of the three primary forms, the *line*, the *circle*, and the *angle*; of which all other linear figures, geometrical and literal, are only variations or compounds.

195. So, again, the letter Y appears to be a compound, both in sound and figure, of the V and I. By opening A to a right angle, and adding the letter ⊢ to it at the bottom, E is in like manner composed; and U is nearly a compound of O and I, or U and I; whence the vowels, as secondary both in figure and sound, seem to be produced by compounding their primaries interchangeably.

196. A particular investigation of the characters of the various antient and modern alphabets might supply other similar coincidences; not that either the figures or sounds of letters were really originated as above, notwithstanding the possibility thereof, but that they became such, in time, through a natural tendency, and the immutable relation and connexion between things natural

* "Remains of Japhet," pp. 330, 404.

and artificial, by which the most arbitrary acts and contrivances of man are influenced and attracted; biased like a congeries of needles by the magnet to its poles, or gravitating, like bodies, to the same centre, however deflected by accidental forces; and evincing that art in man is at its origin furthest removed from the practice and perfection of nature, to which the artist in the end attains. Accordingly, the vowel sounds were not distinguished by the inventors of the alphabet, nor in the earliest languages; but this was principally reserved for the Greeks, who all but attained the simplicity and perfection of nature therein.

197. Yet in the etymology of letters, as of words, there may be much plausible conjecture with little certainty. It is, nevertheless, truly remarkable, that the sacred name Je-hO-vAh, one of the most antient of the appellations of God, the tri-literal tetragrammaton of the Hebrews, which they held to be incommunicable, too sacred to be pronounced, and of which, it is said, the genuine sound is lost, comprehends, evidently, the three primary letters, or elements, of all language, and three only in the original Hebrew, יהו; and is, therefore, a name and construction the most honourable and expressive of His universal essence. It was hence, perhaps, that the Hebrews of old held this name mysterious in connexion with the primitive doctrine of triunity.

198. It is no less remarkable that in Greek

Δ I O, also one of the most antient names of God, is literally constituted of the three primary geometrical figures, the elements of all possible forms, which are also almost as distinctly marked by the Roman letters of the word JAO, another antient name of God, from whom, according to antient heathen writers, Moses received his laws; and which word is undoubtedly derived from the JAH of the Old Testament. But this inquiry involves materials for an endless dissertation.

199. It may not be impertinent here, nevertheless, to remark, that the vocal sounds I, O, A, being analogous to the common chord in music, and capable of the same inversions and variations, may give harmony to the name Jêhôvâh, which includes them descending, as the word Hârmônîe does ascending; and hence, also, the general eûphônîe of tri-syllabic names, such as Môntâgûe, Wâshîngtôn, Wêllîngtôn, &c.

200. We may ascribe, also, to a like musical and rhythmic principle the gratification which the ear receives from alliteration and the general harmony of language, so far as the ear is affected by literary composition, and in particular by poetry.

201. So much with regard to vocal signs and characters, or *letters;* next to which are semi-vocal characters, or *accents,* which are signs related to the first composition of letters in syllables and words; after which follow mute characters, or *points,* which relate to the composition of words in sentences.

To the two latter orders of characters belong accentuation and punctuation, both of which are of Grecian origin and triple analogy, and of each a very brief analysis may here suffice.

SECTION II.

202. ACCENTUATION comprehends three distinct characters, and their offices,—the *acute accent* [/], which marks elevation of voice; the *grave accent* [\], which marks depression; and the *circumflex accent* [∧], in which the other two forms are conjoined, and denote continuity of voice, rise, and fall, or the double cadence of acute and grave; and these mark the emphasis of simple sounds, with respect to note or tone.

203. But *accent* belongs not only to letters and syllables, but also to words and sentences, and then it takes the name of *emphasis:* it belongs finally, also, to themes and *emphatic sentences*, which in printing are distinguished by italics, capitals, and large capitals, as they are in manuscript by single, double, and triple underlines.

204. There are also *accents of quantity* with regard to time, which are either *long, short,* or *mean;* of which two only require marking, namely, the *long accent* [—], and the short accent [⏑], and these relate to all the varieties of metre.

SECTION III.

205. Finally, PUNCTUATION, which belongs to the composition of words and sentences, has also three principal characters — *the period* [.], which marks and terminates an entire sentence, or period; *the comma* [,], which denotes its simplest member, or division; and *the semicolon* [;], in which the two preceding characters, or points, are combined, for dividing compound periods, denoting a half period, or member.

206. As to the colon, or double period [:], which denotes conjunction of illustrative matter to a period already complete, it is a *note of conjunction*, similar to the *note of interrogation* [?], which is formed of the initial [Q] of Query, placed over the period at the end of a question; and the *note of admiration* [!] is formed by accenting the period [!], to mark an emphatic sentence, or expression: all of which are sufficiently expressive signs.

207. Punctuation, which is analogous to the pauses or rests in music, and similarly regulated, has, however, in strictness, a wider reference, and may be sensibly denoted by spaces of different lengths, in the manner of those used in the separation of words, which were originally written continuously in lines, without separation of any kind. Or the common points may be substituted by vari-

ous lengths of the line, or dash [—], as it sometimes is; or by the positions of the point, or period, at the top, bottom, or middle of the letter, as was once the practice.

208. The dash is also used to denote the omission of words, and then it is called an *ellipsis;* as it is also to bound a *parenthesis*—thus—for which purpose brackets and crotchets are commonly employed [thus] and (thus); as are also commas ,thus, in which use commas would be better inserted as they are in marking quotations, by inverting the first comma ‘thus, — or inserting instead thereof the spiritus asper, in the manner recently suggested by Mr. Hood, ‘thus,

209. Besides these there is, opposed to the parenthesis, the caret [∧], employed to mark the place of introduction of any words wanting, from $\underset{\text{above the line,}}{\wedge}$ or, thus, inverted, $\underset{\text{from beneath}}{\vee}$ the line; also the hyphen [-], for connecting of syllables and compounding of words, &c.; and the brace [⏞], variously employed for connecting the especially related members of discourse.

210. Of these, as of all literary signs and characters, simplicity of form and natural indication is the perfection; such as is the hand [☞], for pointing out some matter for especial notice or attention.

211. Many other arbitrary signs and abbreviates

are employed in literature, which, being of less general reference, are better suited to a universal and practical treatise on Semiotics;—a desideratum in literature pregnant with utility. To this subject belongs literary Notation, of which we shall have to speak in a succeeding outline.

212. All literary punctuation is employed in aid of sense and expression; but, as these are literally illimitable, the points in use do little more than mark the chief divisions and termination of sentences to the eye, and leave the many shades of expression, through pauses, to the judgment, taste, and discretion, of the reader: so that the times usually assigned to mark pauses — as one, two, and three, to the comma, semicolon, and colon — are by no means invariable, but are, or ought to be, entirely subject to emphasis, harmony of expression, and sense. In poetry, they also give way to the rhythmus and measure; and the reader who is inattentive to this converts poetry into prose.

SECTION IV.

213. So much for Semiotics as the science of simple signs, or points, accents, and *Letters*. But *Words*, which are the subject of Grammar, are compound signs also, and therefore are a part of semiotics, as letters are a part of Grammar, as its name expresses. So also are *Sentences* and pro-

positions, which are the subject of Syntax, are complex signs, and belong also to semiotics, and to Grammar; and there is no absolute division of the three, for they are co-essential, and the whole of Philology is the science of *Signification.* Hence, also, the figures of Rhetoric and Prosody, which arise as subjects of syntax are semiotic, and the metaphor and comparison are signs, and Poetry throughout is symbolical. Hence these divisions of Philology are employed, not as absolute, but for easier elucidation and analysis, as relative and regulative.

CHAPTER III.

GRAMMAR.

214. THE second literary or philological science is GRAMMAR, which, in common acceptation, extends to the whole of Philology, but denotes here the science of the nature and relations of words or terms only, and has been, in a practical view, not ineptly defined "the art of expressing the relations of things by words."

215. Of simple articulate signs or letters are composed syllables, which are compound vocal sounds, each including one primary vowel, and no more, with its consonants, and also *words* or names, which are compound articulations, resolvable into as many syllables as they contain simple vocal articulations or vowels, and are significant of things, or of thoughts, or of the relations of thoughts and things; and upon these, therefore, depend the reciprocal relations of words.

216. Words are simple, or monosyllables, or they are compounds of two or more syllables; and as every syllable has a principal sound or vowel

through which it is *articulated*, so every compound word has a principal vowel, and the syllable containing it is predominant and *accentuated* in such words, and is, or should be, that syllable to which a word owes its chief *signification*.

217. In like manner, every *sentence*, enunciation, or proposition, has its principal word, predominant or emphatic sound, determined by its chief signification; for the *emphasis* is determined by the sense of a sentence; and, if the elements or members of a syllable, word, or sentence, are complex or numerous, they have not only the predominance of powers spoken of, but they have also a subordination of secondary powers in their articulation, accentuation, and emphasis: so analogous is nature and genuine art in constituting systematic wholes of their minutest, as in their greater works.

218. Although *signification* properly determines both accent and emphasis, yet accent chiefly depends upon the ear, and emphasis upon the understanding; and, inasmuch as the signification of words is fixed, and that of sentences depends upon the speaker, accent and emphasis differ: the full force of expression, nevertheless, depends upon their union or coalescence.

219. So much for sound; and as to signification, which is principal in words, the logician knows that every perfect proposition consists of something asserted of something; it therefore

simply discloses *a relation* of two things—the one *a subject*, the other *an attribute;* and all that can be asserted may be delivered in, and resolved into, these simple propositions, consisting of three words or terms.

220. It is clear, therefore, that there can be no other relations of words, or simple parts of speech (however variously they may be distinguished by Grammarians), than *Subjectives*, or Nouns-substantive; *Attributives*, or Nouns-adjective; and *Relatives*, or Verbs. Particles, which include every denomination of speech that denotes conjunction or connexion, are relatives or verbs, or verb-substantives or attributives, abbreviated and compounded; as Tooke has, in many instances, satisfactorily proved in his "Diversions of Purley."

221. So, again, *Substance*, or Essence, and *Relation*, are philosophical universals and logical categories; and as they are thus objectively as well as subjectively universal, so also must they be representatively universal. Hence, the *Substantive* and *Relative* are the true universal generic distinctions of words or parts of speech, comprehending all others.

222. Accordingly, all words are either names of objective beings or things, or names of subjective relations or thoughts; or, finally, they are names of representative signs or words. The first are called *Nouns Substantive;* the second,

Nouns Adjective; and the last, simply the Verb or word — that is, the *Noun Relative* or connective; and these correspond to the Subject, Predicate, and Copula of logic, and their common nature is expressed by the term Noun, or name, under which they are reciprocally convertible.

223. Accordingly, Substantives by predication become Adjectives; thus, *gold* becomes *golden;* and *impiety, impious,* &c. So, Adjectives by subjection become Substantives; thus, *good* becomes *goodness,* &c. Some words are both substantives and adjectives; and others are at once all parts of speech, according as they may happen to be employed: thus, we say *white-lead,* or *lead white; white-chalk,* or *chalk white;* or these words become verbs, as, *to chalk, to white, or whiten,* &c.

224. So, again, Verbs become Substantives or Adjectives; thus, *to hate* becomes *hatred* and *hateful,* &c. And the verb-substantive and verb-adjective, called Participles, are verbs either subjected or predicated; thus, *to hate* becomes *hating* and *hated,* &c. And so on, interchangeably of all words; which, like all thoughts and all things, are relatives, to distinguish or to connect, and not absolutes.

225. Hence the *Verb,* which has been dignified with pre-eminence among words, appears to involve or combine the powers of the substantive and adjective, either expressly or implicitly, and thereby to become a true medium for uniting subjects and

predicates in conjoint signification or discourse. Accordingly, the Verb is a Substantive or Subject, with the adjuncts or adjects of time or tense, number, case, gender, figure, &c.;* which relations are denoted by certain abbreviate auxiliaries, inflections, or terminations, &c.; the employment of which, while it has contributed to the brevity, facility, and grace of language, has been the means of concealing the true nature and office of the verb.

226. It is apparent, then, that the verb is the cement of language, and the principal of Connectives, among which it is included with the conjunction, adjective, adverb, preposition, &c.; all of which latter parts of speech the ancient Sanscrit grammarians justly considered as indeclinable nouns.† Thus, our distinctions of the first genera of words, analogically deduced, do not essentially differ from the most approved authorities, including Aristotle's; who, in his treatise of Interpretation, begins by distinguishing language into Noun and Verb, and afterwards calls verbs nouns, having the attributes of connexion, time, &c.

227. It may be worthy of remark here, that all

* In the language of the North American Indians, instead of the distinctions of *gender*, they use distinctions of *genera*—i. e. *Animate* and *Inanimate*; with them every thing is *he*, or *it*, &c. Their Plural is triple; namely, *Dual*, *Definite*, or general, and *Indefinite*, or universal.—See *Buchanan on the North American Indians*, pp. 220, 289.

† "Asiat. Researches," Vol. VII. p. 215. Lond. ed. 8vo.

the verbal attributes of time, number, case, gender, and figure, have been triply distinguished: time, as past, present, and future; number, as singular, dual, and plural; case, as nominative, genitive, and objective; gender, as masculine, feminine, and neuter; and figure as simple, compound, and decompound; so naturally are words prone to adapt themselves to the relations of thoughts and things, and the universal analogy of nature.

228. Pursuing still the logical and analogical distinctions of words as signs, they are either particular, general, or universal. If particular, they are *proper names* of individuals; if general, they are *common names,* or special terms; and if universal, they are *categorical terms.*

229. Names are not formed upon the most intimate and accurate, but upon the most evident and superficial qualities and properties of things; hence, the nomenclature of science requires change, and cannot become fixed till knowledge has attained perfection. Early language is particular, sensible, long-worded, and diffuse; but in its maturity language becomes brief, abstract, general, and intellectual.

230. Hence, the words of permanent language are for the most part *general, or common terms;* for *proper names,* belonging to particulars or individuals, might be infinite in endless succession, and are rather accidents of language than language itself. These are also usually adopted or

derived from general terms; while, of *universal terms*, language is so deficient, that they also are, with few exceptions, borrowed from general terms.

231. This power of general terms arises from their either possessing inherently the three distinctions of *particular, general,* and *universal,* or their acquiring it by added signs, such as are the Articles *A, An, And, Add, As, Any, All,* and the other grammatical signs of number, as singular, dual, plural, total, &c.; such as *One, Some, No, None,* &c.

232. Of the use of these added signs we need not examples; and of the inherent significations of terms the following may suffice, in the ordinary usage of the word *Man.*

As Particular—A *man* came here yesterday.
,, General —*Man* is addicted to war.
,, Universal —God created *Man.*

In these three propositions, the term *man* is equivalent to *A man, some men, all men.*

233. Inadvertence to this power of words is a frequent occasion of ambiguity and false argument, since that may be true of the individual which is false of the many, or true of the many which is false of the whole; and *vice versâ.* It has also occasioned terms, significant or indicative of generality or universality, to be disregarded, as belonging to the class of *Articles* to which, in truth, belong all terms and terminations expressing a

unity, whether it be universal, general, or particular, or signify number, as dual, plural, &c.

234. The *Article*, then, is a sign or word significant of a particularity, generality, or universality, as modes of being; but, in some cases, also, it defines or identifies the particular, general, or universal, as in the *definite articles, The, This, These, Thee, Thou, They, That, Those, Them,* and other *pronominal articles;* for the *Pronoun* merely identifies or defines with the adjects of number, &c., as the Article does. *Which* and *What* are but interrogative, or sometimes assertive forms of *this* and *that.*

235. What Articles are to nouns, *Auxiliaries* and terminations are to verbs; they are categorical expressions, or adverbial signs of being or relation, employed as significant adjuncts to the verb, to indicate its relations and accidents, and to abbreviate and generalize language, by freeing it from the necessity of a constant repetition of particulars and periphrases. Such are the auxiliaries, *Be, Have, Do, To, Shall, Will, If,* &c., which are traceable to universal logical predicaments or categories.

236. Of these Auxiliaries, *Be,* and its inflections, denote the prime category, *Existence, subsistence, or substance; Have,* and its inflections, denote *Possession and Habit;* and of this word the preposition *of* seems to be a corrupt, or original pronunciation; and *av,* or *have* unaspirated, is still a

common provincial pronunciation of *of*. *Do*, &c., denote command and *Action*; *To* signifies *Place* indefinite, as *Shall* and *Will*, &c., do *Time*, and *May*, *Can*, &c., denote *Power* or *Potence*, and *If*, *conditionality*, &c. Whence the distinctions of the *moods* and *tenses* of verbs, of which they are the signs, as other signs are of the distinctions of *quantity*, or *number and person*, &c., in coincidence with the article.

237. This reference of the Auxiliaries is confirmed by etymological coincidence also; thus, *Is* appears to belong to the regular form of the third person singular of the verb *to be*, declined thus: I *be*, thou *be-est*, he *b'-is*, or *is*, or *exists*. With the definite article *the*, *Is* becomes *The is*, *Th'is*, or *This*, and also *Th'ese* and *Th'ose*. Again, *It* appears to be the irregular form of *is*, or *b'is*, namely, *b'it*; and both *is* and *it* signify existence or being;—from which, in like manner, come *The-it* or *Th'at*, *They* and *Them*. Thus do these pronominal articles belong to the same category as the article itself.

238. These words are full of signification, and afford the briefest identical propositions in our language, as *it is it*, or *th'it is th'it*, or *that is that*; or, again, *th'is is th'is*, or *this is this*, or *this is that*; which propositions say little to sense, but comprehend and import much, and are forms of universal application in the language and reasoning of mankind.

239. The universal substantive pronoun, *thing*, appears to originate, in like manner, from *th'ing*, *the-ing*, or *being*; and the termination *ing*, which distinguishes *the active participle*, seems also to be an abbreviation of *th-ing*, expressing *being*, existence, or action: thus, *writing* is the *write-thing*, or *to write, in being or act*; and the like of other verb-substantives. So likewise the verb-adjective, or *passive participle*, terminating in *ed*, may be derived from *had*, the past tense of the verb *to have*: thus, *Printed* is *printhad*, &c.

240. Barbarous and uncouth as such anomalous expressions, even as examples, may seem to the ear, still their signification is complete. Etymological discussions, however, any further than they may serve to establish the philosophical and logical principles of words, are out of place here, and of little other use any where; we might otherwise trace all the *Particles* to their like brief categorical relations with like plausibility.

241. We must not, however, omit the words or signs of affirmation and negation, which are universal representatives, or replicates which answer to sentences and interrogations without repeating them; thus, instead of replying "*we will, or will not, go to Richmond to-morrow*," in answer to the question, "*Will you go to Richmond to-morrow?*" we reply, *Yes* or *No*, which may be etymologized from *A*, signifying existence or being,

thus: A { *Ay*—*Yea*—*Ayes*—*Ais*—YES; be it, or be it so. / *Nay*—*No-a*—No; whence, No one—None—Un—In—D'is, &c.

242. Thus *Affirmation*, which includes negation, belongs to the same category as the Article, and might be considered as a distinct part of speech; if, indeed, it comprehend not the whole of speech, since it is a universal definitive, and the whole business of language is either to *affirm*, to *interrogate*, or to *command*: but this belongs to the composition of words, or sentences, or Syntax.

243. So much for the genera of simple words as words, which may be, and have been, distributed into species arbitrarily, and very variously distinguished as parts of speech, according to the variety of the things they represent, or the peculiar views of grammarians; but, though we ought not to lose sight of the philosophical and logical relations and distinctions of words, it does not follow but that the distinctions of the parts of speech by grammarians may and ought to vary with the particular structure of language, and that these distinctions may also be very advantageously employed in teaching of grammar as an art, or discipline.

244. Individual words and terms are in general equivalent to as many words as they have significations, of which most words have, or are suscep-

tible of, a great variety, which are to be learned from their context in writing or discourse; which, again, is too various to be defined. Hence, their significations change with every new relation or association; even a motion or gesture to the eye accompanying a word, or a tone to the ear, effect this change, and there are no more *absolute* significations of words than there are of ideas; and words are subject to all the mutations and distinctions of thoughts and things. It is hence that grammarians are often perplexed in deciding to which of their parts of speech a word belongs.

245. Words, too, like letters, are *sounds significant*, and have, therefore, a double appropriation, to the *ear* and to the *understanding;* and the most significant sounds afford the best or most expressive words. Further, as we speak to the ear, so we write to the eye; in which way CAPITALS and *Italics*, which should never be employed, either initially or in composition, otherwise than emphatically, add signification to words, as *accent* and *emphasis* do through sounds, — e. g., *Excúse, Excuse, — Attribúte, Attribute,* &c.; and in the first case, words alike in sound, but different in signification and formation, or spelling, are the same to the ear, but differ to the eye and understanding; the first belonging to the Orthoëpy of words, the latter to their Orthography.

246. With regard to the ear, harmony of composition belongs as well to the euphony and ac-

cordance of words, as it does to elementary sounds, or letters, in the first instance. But, with respect to words, the most important consideration of all is their relation to understanding, the chief end of language being the clear conveyance of thought; and in this respect the analogy of structure and orthography are of chief importance.

247. It may be held as a rule, therefore, in the employment of words, that nothing ought to be an offence against grammar which is not, at the same time, an offence against reason and just signification, or good sense; nor can any practice in this respect be good, which, however tolerated by custom or idiom, violates this rule; and, as clear conceptions depend upon accurate relations, so perspicuous signification depends upon the like relations of signs.

248. The virtue of language, therefore, lies, above all things, in a correct analogy of its structure and members; and, accordingly, the most perfect and fertile languages are distinguished in this respect — such as is the Greek; and such also, so far, at least, as respects the structure, is our own vigorous and simple dialect.

249. The Greeks, who produced the most perfect models in art and philosophy, did not fail to do the same in language, making nature rightly understood the ground of improvement — accommodating every thing through analogy to the genius of their own language, as originally consti-

tuted, they did not attempt refinement by foreign additions, which they regarded as barbarous; and, by the same means, we may arrive at the same end in a language, the natural principles, and probable similarity of origin of which so much resembles theirs, and which is fraught with the same free and philosophic spirit.

250. It is the plastic power of the Greek language derived from analogy, and the flexibility of its terms and significations, that render it capable of modulation to all relations, which is the property most essential to science, and that which qualifies a language for the nomenclature of science universally.

251. Analogy merits, therefore, the first attention of the grammarian and improvers of language, and is, in the employment of terms, of much greater import than either custom or etymology; which are, nevertheless, to be respected, excepting only when understanding demands their suppression. Hence we have ventured to employ the term *vegetal* (as Shakspere did, and as our neighbours the French do) as a substitute for vegetable, in relation and connexion with *animal* and *mineral*, &c.; for we cannot say animable and minerable in connexion with vegetable.

252. We would, according to the same analogy, use also the word *sensial* instead of sensible, in conformity with *material*, because the tyrant custom has given a gross acceptation to the term

sensual, which disqualifies its correct analogy with *intellectual;* and we cannot say *materible* in conformity with *sensible,* much less *materient* with *sentient,* or *materitive* with *sensitive;* although, by force or favour, *intellectible* and *intellective* might be tolerated or pardoned. We might apologize, on the same ground, for employing the term *generalogism* in the place of *induction,* in accordance with *syllogism* and *analogism;* and also for a few others of obvious signification.

253. This is a point, however, upon which we can hardly hope to escape the censure of the verbal critic, who never overlooks, rarely pardons, and hardly ever applauds, a new term or a new signification: without this kind of jealousy, indeed, nothing could remain with stability; but, at the same time, without some relaxation of convention and institution, we could only have sinensian permanence, without progress or improvement of any kind. Still, we ourselves readily condemn all needless innovation in the established language, and more so in the nomenclature of philosophy, till such a uniformity of relations throughout science shall have been confirmed as will naturally conduct to uniformity of structure, relations, and termination among words.

254. The last thing with regard to words individually, and that which lies nearest to their composition, is the relation of sameness therein, or of their repetition in composition, which writers

avoid for the sake of euphony and variety; but as a particular colour in a picture, standing alone and unaccompanied by touches of the same hue, becomes a spot, so it is with any leading, or significant word, unrepeated in a composition; and this not only with respect to the harmony and connexion of words, but also of thoughts, for the leading thought of any theme must be variously repeated to hold a discourse well together. Subordination to a unity is the great principle of all construction of every kind; and the maxim according to which writers too strictly avoid the repetition of a word, is, therefore, often at fault, and always so when it sacrifices unity of signification to variety of sound: but this brings us to the composition of words, or Syntax.

CHAPTER IV.

SYNTAXIS.

SECTION I.

255. The third and last division of Philology is *Syntaxis,* which is the science of systematising words, or of the construction of *sentences* or propositions, periods, arguments, or discourse, simple or compound; and it involves the art of verbal or literary composition. In a particular and accepted sense, syntax is the art of arranging words according to the established rules of a language.

256. The *sentence,* or proposition, is a compound sign, which implies or contains, essentially, at least, one of each of the three primary orders or genera of words: a *substantive,* or objective; an *attributive,* or subjective; and a *relative,* or connective; and these must agree in number, case, and gender.

257. But as some single or simple signs (whether letters or syllables), are *words,* so some words are *propositions,* and hold an intermediate station

between simple terms, or signs, and perfect compound significations or sentences; and such are many of the inflections of verbs.

258. The rules of construction for the simple proposition are those also of the period, or compound proposition, and of all discourse which consists of propositions connected in series.

259. Many attributes may be connected with an object or objects, or many objects may be connected with an attribute or attributes; and these also afford *compound sentences*, or periods, and parenthetical propositions: and sentences may be attributed and connected parenthetically in the like manner of words.

260. Rhetorically, the *Parenthesis* has been objected to; but every compound proposition is parenthetical, nor can any sufficient discourse be conducted without some *putting in:* and the periods which comprehend no parenthesis must necessarily be short and meagre enunciations, tiring to the eye and teasing to the mind, although admired by many for their terseness.

261. This fashion of modern composition is opposed to the excessive employment and involution of long parentheses by old writers, who often introduced several of them together, or, what is worse, one within another, embarrassing the sense, and sometimes springing from, and always producing, obscurity and confusion.

262. The *Ellipsis* is the opposite of the *paren-*

thesis, and they may both become either a grace or a deformity, a good or an evil in discourse; for it is upon the addition and substraction of words, rightly calculated, or upon the proper *putting in* and *leaving out*, that the truth, beauty, and excellence of all composition, and the fulness or faintness of the sense depend. But we digress; and the *Digression* and *Episode* are to a poem, or an entire discourse, what a parenthesis is to a period or compound sentence.

263. To return to our position. The logical relation before noticed, as belonging to words and simple signs, prevails also in sentences; thus, they are particular, general, or universal. They are also, as before shewn, *simple enunciations;* as, for example, "the dog barks," "the bird sings," "the mathematician calculates," &c. Or they are *compound propositions*, periods, or arguments; or they are compound arguments, or *continued discourse.* But each of these the grammarian acknowledges by the name of *sentences*, as the enthymeme and sorites are acknowledged to be syllogisms by the logician.

264. As sentences and propositions can only assert something, or ask something, or command something, there can be no other propositions or sentences than such as are either *enunciative, interrogative,* or *imperative.* All these are, however, only logical, or relative to the understanding, and connect this branch of knowledge with the science

of Logic; of which propositions constitute the matter, and of which their signification is commonly treated as a part by logicians. It is, therefore, for completeness of outline only, that we have here instanced their kinds and construction.*

265. Again: Propositions and Sentences, like words and letters, are sounds significant, or signs, and have, like these, a double reference; the one principally to the understanding, which is *logical;* the other, principally to sense, or the ear, which is *rhetorical,* or prosodial, the science of which connects or lies intermediately between logical and philological science: for there can be no absolute beginning nor termination among correlative things.

SECTION II.

266. RHETORIC and PROSODY, then, come in incidentally here, as a branch of Syntaxis intimately related to each other; and they denote the science and art of combining signification with sound, so as, by the association of agreeable or discordant words and conceptions, to affect the mind through the media of the senses, passions, and affections, and constituting *Poetry* in its widest acceptation.

267. Now, sound significant belongs to philology universally, and we have seen that its matter or elements are *letters.* Intelligence is also con-

* See Aristotle's "Treat. of Interp. Org."

nected with sound significant in *sentences*, or propositions, which are the matter and elements of Logic; and between these lie *words* and terms. Rhetoric, therefore, extends to the whole of Philology.

268. *Philology* and *Rhetoric* differ, nevertheless, in purpose; that of the former being by sounds and signs to convey ideas and thoughts, while the purpose of the latter is, by uniting sounds and signs with ideas or images, to excite feelings and sentiments; the one refers principally to active intellect, the other to passive intellect.

269. The simplest rhetorical effects are those of Letters, or *alliteration*, principally with regard to sound; and there are three kinds of alliteration: one *rhymical, and in part rhythmical*, arising from the repetition of the same letter or sound; another, which springs from the *melody* of different letters or sounds succeeding appositely; and a third, which arises from the *harmony and contrast* of different, and even of discordant sounds: all of which are employed for the purposes of *expression*.

270. Amid the infinite *variety* under which we view the universe, physical, sensible, and moral, there are an evident *uniformity* among its individuals, species, and genera — an intimate and reciprocal relation — and a boundless and indivisible gradation; and this uniformity, relation, and gradation, are necessary, universal, and complete, con-

stituting a grand and beautiful whole, whose parts are in strict accordance, or analogous, whence all the powers of rhetoric in *sound, measure,* and *figure:* the two first of which address themselves principally to sense, and the latter to the understanding. The chief power of rhetoric lies, therefore, in giving figure to these similitudes of the universe; and in the justness of its figures, or rhetorical truth, so to call it, lies all its value in exciting or determining the mind: but when its illustrations contain no analogy, no true similitude founded in nature, they are false, anti-logical, or sophistical, and lead to error.

271. It is this universal analogy which enables the Poet to form figures of speech in the way of metaphor and allegory, with such beautiful and corresponding consistency between the symbol and the things symbolised. It was this which enabled the antients to animate every part of nature with like characteristic consistency, and to constitute them Gods; and it is this, again, which renders their whole mythology so poetical, and so applicable to all the invocations and allusions of the Poet.

272. These figures of rhetoric, or tropes, as they are called, are comprehended under three general forms—the *Metaphor, Hyperbole,* and prosopopœia, or *Personification,* which are severally related to the three chief Disciplines; metaphors to *words,* hyperboles to *quantities,* and personifica-

tions to *images*, or figures of thought; all of which are employed to *elevate* or *degrade*, through quality, quantity, or relation, the prime categories or universals of logic with which rhetoric is immediately conjoined.

273. We might here expatiate upon a branch of our subject, so naturally and artificially replete with our peculiar regimen as *Rhetoric* is; there being no subject more capable of being cast into system analogically, and none with more advantage to its existing state, the irrelevancy of which has subjected it to the reproof of the satirist,—that

> "All a Rhetorician's rules
> Teach nothing but to name his tools."

274. Rhetoric refers to letters, words, and language universally, and therefore, in its widest sense, comprehends grammar, poetry, and oratory; and it may be called painting with words, and, like painting with the pencil, is distributable into *disposition*, or grammatical composition — *elocution*, or poetical colouring — and *delivery*, or oratorical expression. A fourth division, common to all arts and disciplines, and belonging equally to painting and rhetoric, is *invention*.

275. Again, of this distribution of rhetoric, disposition or composition divides into an *exordium*, or introduction — a *narration*, or argument — and a *peroration*, or conclusion; a beginning, a middle, and an end, which have similar subdivisions.

276. So, Elocution comprehends *contrast and harmony* in the words and colouring, *correctness of composition,* and *embellishment of tropes and figures;* and, finally, delivery with expression consist in *emphasis* or strength, *character* or manner, and *pathos* or passion; for the effect of fine composition depends upon delivery, and that is written well in vain which is not well read. Each and every of these involves somewhat of the others.

277. To illustrate, not to prove, and to excite the mind by true feelings and sentiments, is, upon the whole, the proper office of rhetoric. To demonstrate and convict belong to logic; but since these powers of speech are often engaged with great force in misleading the mind, and rhetoric is the common resort when reason fails, verbal eloquence is ever to be entertained with a suspicion proportioned to its floridness. And its most legitimate office is to animate the fictions of the poet.

SECTION III.

278. With regard to Poetry, more especially, words involve, with signification, rhythms, harmony, and melody; whence *verbal quantity,* or time and rhyme; *epithet, or quality;* and also *metaphoric similitude, or relation.*

279. To verbal quantity, or cadence, belong the rhythmus of verse; and this is determined by *Accent, Emphasis,* and *Measure.*

280. Rhyme marks the verse and distich, or double verse. A stop generally marks the hemestic, or half verse; which, again, is bisected by accent, which marks the feet and distinguishes the time — the arsis, or rise, from the thesis, or fall, of which they are constituted.

281. The fact, that accent and emphasis are even more essential to signification than to sound, has been overlooked by writers on prosody and ortheöpy, who attach them to the harmony of language in measure and period only.

282. As to the melody of *Rhymes*, whether single, double, or triple, they are *unisons* merely; and the easy power of rhyming, to even a common ear, indicates how few the number of radical sounds must be which constitutes a language: and it would probably be found, upon thorough investigation, that the number of rhymes of well-distinguished sounds therein hardly exceeds the letters of its alphabet.

283. Accordingly, the first book of the "Iliad," as translated by Pope, the most eminent of English rhymists, consisting of 780 verses, contains only about 30 rhymes of distinctly differing sounds, founded upon the following monosyllables, singular, plural, or inflected, in three classes, as made vocal by I, O, or A, as follows:

	I, *ie*, *ee*.	
View,	Sight,	Reign,
Reveal,	Fire,	Rest;—
Wise,	Spring,	

O, *oo*, *ou*.		A, *ea*.	
Bow,	Mourn,	Man,	Share,
Down,	Strove,	Stand,	Grace,
Doom,	Store,	Heav'n,	Day,
Wrong,	Cloud,	Spread,	Rage,
Son,	Broke;—	Slave,	Art;—

which occur with continual repetition.

284. The adaptation of homotonous words to each other, or rhyming, therefore, draws little upon the powers of either memory or sense in our language; and it is capable of being reduced to a very simple art, founded on a tabular arrangement, upon the plan of the preceding Alphabet, of which, also, the primary vowels may be the roots; and it would become a useful adjunct of English prosody.

285. This is a relation of rhyme that may merit the attention of the Harmonist or Musical Composer, no less than of the Poet. As to dissyllabical, compound, or double rhymes, it is doubtful if there be any such in use, or if the correct ear can tolerate them: thus, *Sil-ver* is a perfect double rhyme to *Pilfer;* to render it admissible, however, the second syllables, *ver* and *fer*, should not rhyme; they must be *identical or monotonous:* thus, Milton,

> "Straight mine eye hath caught new plea-*sures*,
> While the landscape round it mea-*sures*."
>
> *L'Allegro.*

Such are, therefore, more properly *penultimate rhymes.*

286. Finally, the prosodial and rhetorical effects

of *sentences* add to the properties of words, the period and poetic measure, and the beauty, variety, and significancy of the figures, or analogies of conception, called into action with all the play of thought. Thus, rhetoric and prosody run through the material and sensible to the intellectual.

287. *Poetry* and *Prose* are opposed, as extreme forms of verbal composition or discourse; the first of which merely *symbolises* knowledge, and is allowed to be more antient than prose, which *literalises* it, just as *hieroglyphics* preceded *letters*; hieroglyphs being of concrete, but letters of abstract signification. Hence, the first is more technical; the latter, in both cases, is more scientific and philosophical. They however compound, in a middle style, between poetry and prose, which has especially the appellation of *rhetorical.*

288. As Syntaxis comprehends the various literal, verbal, and sentential powers of words, in the several forms of composition, and the various manners of employing them in the communication of thought, denoted by the general appellation of *Style or Diction,* but principally with regard to prose, this latter is a subject peculiarly belonging to this branch of philological science.

SECTION IV.

289. STYLE, then, being the power and manner of communicating or conveying *thoughts* through

words, has, like the whole of philological science, a double reference, or two extremes; the one of which refers to *signification*, or meaning only, the other which refers to *sounds*. The one designed to instruct, the other to delight; the one perspicuous, the other florid; the first philosophical, the latter poetical; this sensible, that intellectual; in fine, the one belonging to thoughts logically, the other to words philologically; the ultimate extreme of the one being imaginative, or poetical and rhetorical, and that of the other prosaic or literal.

290. Accordingly, words, on the one extreme, are either expressive to the mind or harmonious to the ear, and in their use one or other of these must predominate; while style, as it regards thought, on the other extreme, is either *historical or memorative*, to record; *poetical, rhetorical, or imaginative*, to delight; or *dialective or ratiocinative* to convince: the extremes of which again coalesce, and may be distinguished conjointly as *didactic*, and their mean as *poetic*.

291. These modes of diction or style, which are simple and generical, are, however, rarely called into strict and uncompounded practice, but mix according to the nature and relations of the subject, and the endless variety which characterises and individualises the styles of different writers.

292. Thus, on the loftiest of all subjects, the

religious or theological style is compounded variously of the dialectical, or philosophic; the poetic, or rhetorical; and the historic styles; in which, nevertheless, the first of these should predominate and characterise its delivery: for the majesty of the subject is intellectually incompatible with the decoration of language, and becomes most sublime and impressive when delivered with simplicity unadorned. Yet, in levelling this subject to the infirmity of the human mind, so as to penetrate the soul through the heart, it may be sometimes necessary to resort to all the persuasions and charms of verbal eloquence. The like composition, regulation, and latitude of style, belong also to all inferior subjects.

293. From these principles it follows, that the style of literary and oral composition should be adapted to the design either to instruct or delight; if to delight or amuse only, then must there be a sacrifice of signification to sound and poetic beauty; if only to instruct, then must all other things be sacrificed to perspicuity; but if, finally, the design be to persuade, and to blend amusement with instruction, the delectable with the profitable, then must the style be more or less florid, or perspicuous, according as the design may be more or less to delight, to persuade, or to convince or instruct. The first case will afford the *poetic style;* the second, the *didactic;* and the last, the *rhetorical, eloquent, or oratorical;* which, again, have each their

extremes and mean: thus, the *free style of oratory* is a mean to the *simple* and the *sublime*, and these may be variously compounded.

294. If this distribution be correct, there will be no difficulty in forming a critical judgment of the propriety of style in any work, according to the design of its author; and, since readers are prone to amusement rather than to instruction, there will generally be found a corresponding failure in style on the side of floridness and tumidity.

295. Of the *poetic style*, which embraces the whole ground of literary amusement and eloquence, which address themselves to the understanding and passions through sense, and comprehend, therefore, a wider sphere than either the philosophic or historic styles, which are didactic, and divide between them the simpler ground of instruction, we need not here much inquire, since it has little connexion with a philosophic purpose, and will again fall under our notice. This style has also principally occupied the philologists, and has been amply unfolded in many celebrated works of the rhetoricians, while it has almost entirely usurped the ground of this science, to the exclusion of its correlative branches; so that it is to be feared the *poetic and rhetorical style* has had too much influence in philosophy, and that, ere we can make any considerable advances therein, it will be necessary that our taste should be amended with

regard to the style in which it is too commonly delivered.

296. Poetry, in its practice, gives flexibility to language, and facilitates the employment of words; it is, therefore, an excellent discipline. Without having had some exercise therein in rhyme, measure, and the choice of words, few prose writers will excel in harmony of composition; while the prose of the poet will be more apt to fail in the matter or thought, than in the manner or language.

297. The evil effect of this art upon prose and didactic writing, is that of influencing thought by addressing the ear and imagination only, without penetrating the understanding; for these are the qualities of the most successful productions of the muse. To play upon the borders of the higher faculties of the mind, without permanently entering them, appears to be the chief aim of the poet's art; nevertheless, we do not assert this in any other than a relative sense: for, without some degree of higher intellection, imagination itself cannot be affected.

298. The middle style in the present view, or the *historic style*, though its main purpose is instruction, partakes somewhat more of the eloquent, poetic, and pleasurable, than the philosophic style does. The first office of the historian is to record *facts:* if, therefore, he adopt the language of romance and poetry, he adopts the false medium of *fiction*, subjects his fidelity to suspicion, and per-

verts the historic design. In the genuine historic style, therefore, poetic license should be subordinated to philosophic truth; as, in the poetic style and oratory, truth is subordinated to Imagination.

299. Fact and fiction, history and poetry, truth and falsehood, harmony and discord, are analogous pairs of extremes, of each of which the intermedia constitute an infinite series; fact, history, truth, and harmony, are reciprocally relatives, and there is nothing absolute in their opposed extremes. Hence, as discord is defective, or redundant harmony, so is falsehood defective, or redundant truth, and so of the rest; for absolute falsehood, if it were possible, would obtain neither credence nor currency.

300. And thus, also, poetry and history combine. Witness the ancient fables and tales of the East, which, in the garb of fiction, bring us acquainted with moral truths; and the modern romances and novels of the West, which envelope falsehood in the garb of fact: the first, which excite the imagination to the reception of truth; the latter, which fill the mind with false representations of reality. So much for the middle, or historic style, between the poetic and philosophic.

301. If, then, philosophy regard only truth and instruction, every species of poetic, or figurative language, must be either sacrificed, or subor-

dinated in a purely *philosophic style*, the first essential of which is perspicuity. As perspicuity of expression is the chief essential of the philosophic style, so is perspicuity of thought the very essence of philosophy itself; and both these are promoted by brevity and simplicity.

302. In the choice and combination of words for instruction, according to the true aim of philosophy, the most elegible are those which are most expressive or significant; and of these, those also which are most generally understood: hence, the ordinary native terms and common construction of a language are preferable to those which are uncommon and exotic.

303. It is, in this respect, particularly expedient to the advancement and unity of the sciences that the technicals, which keep asunder related sciences, should be, as much as possible, assimilated or dispensed with; and that the universal philosopher should employ the most general and comprehensive terms and expressions.

304. It is essential, also, to a clear conveyance of thought, that he who communicates, and he who receives, should understand words alike; a paucity of ideas in the receiver may, therefore, become an insurmountable bar to the right understanding of the clearest composition or discourse: and those who are accustomed to apprehend through excitement of sense rhetorically, will not com-

prehend propositions and arguments addressed in precise language immediately to the understanding.

305. Hence, we often hear the complaint of readers "that a work is too learned or scientific," or that they cannot understand that which is clearly and accurately delivered; as if expression could be too scientific for knowledge, or as if it were incumbent on an author to furnish his reader with understanding; or, in fine, as if knowledge, science, and understanding, were not alike, or identical. But, by too scientific, is sometimes implied too abstruse,— too encumbered with the mystery and machinery of learning; which, it must be confessed, are but too frequently employed, not for the facilitation and elucidation of understanding, but either in the parvity of thought, the pride of learning, or as a disguise for defects, or a substitute for the deficiency of real science: so that readers are often deterred by apprehension of difficulty, from exertion of understanding altogether.

306. Whatever is ostentatious in thought or expression, is inconsistent, also, with the native simplicity of philosophy. Hence, all parade of learning and science is as destructive of the aim, as it is unworthy of the dignity, of philosophy, or as affectation of mystery is beneath it; nor is even redundance, or change of terms, at the expense of perspicuity, however agreeable rhetorical diffuse-

ness and variety of expression may be to the ear, to be tolerated in a style purely philosophic.

307. Eloquence is, in some measure, a natural faculty not unknown to savages, who often excel therein; fine writing is but this faculty ruled by art, and delivering itself by the hand instead of the tongue, to the eye instead of the ear. But eloquence is always allied to poetry and sense, and is thence an unfortunate faculty in philosophy; unless, indeed, it be entirely subjected, or subordinated to intelligence, as distinguished from sense, and then it sheds a grace upon philosophy which enhances its satisfaction to the mind. In philosophy, however, it is to be deplored that eloquence too commonly passes for science; but truth alone is the just eloquence of philosophy, and without it the finest composition is but babbling and vaniloquence.

308. We may venture further even to assert, that the genuine eloquence and poetry of language is *philosophic truth* (for the sublime, the grand, and the beautiful, all lie within the field of philosophy); but when we are unable to reach this perfection of truth and reality, we content ourselves with fictitious seeming, or *poetic truth;* truth being essential to the mind, which rejects whatever comes without its appearance. Accordingly, the rude language of early society is highly figurative and poetical, while philosophy is simul-

taneous with accuracy of language and refinement of thought, for which poetry prepares the way. We need not instance this among any savage people, nor cite Ossian as an example: Homer and Hesiod were before Pythagoras and Plato; the latter of whom was called poetical because he dramatised Philosophy, and decorated her with the garb of fiction.

309. To think correctly, and deliver perspicuously in suitable terms, comprehend the whole excellence of writing; and perspicuity is throughout the test of a pure philosophic style. This is true, even to the very *letter*, of which the most distinct is the best; and in the pages of philosophy nothing ought to be admitted that has not a meaning in useful or necessary connexion with its matter, however it may be apparently justified by the prejudice of custom or authority: while, on the other hand, every possible aid, even of matter and mechanism, is to be adopted which may give clearness of signification, and facilitate the conveyance of thought. Hence all ornament, and whatever is multiplicious or superfluous, either in matter, form, or manner, are to be rejected in the recordings of philosophy and science, which would thereby acquire simplicity and harmony, in place of gaudiness and complexity; strength or power, in place of magnitude; and dignity in place of ostentation.

310. False taste, and a propensity of writers

and orators to hyperbole and bombast, have led to the employment of extreme terms, superlatives, compounds, and sonorous words, on trivial occasions, indiscriminately, till it has become, by a returning tide, a maxim of good writing to use simple, obsolete, and colloquial language; and it will be well, in this case, if fashion escape the extreme of falling into coarseness, quaintness, cant, and vulgarity.

311. Another thing exceedingly barbarous in composition, and never practised by those antients whose works are distinguished as classic, and allowed to be the most perfect models of style, is the introduction of foreign words and phrases. These, for the most part, violate time and place, interrupt the sense, and injure the harmony of composition, even to those who are acquainted with the languages introduced; and to others they are just as absurd and unmeaning as the text might be if such words were struck out altogther, and blanks were to supply their place. This practice, and those of quotation and annotation, will never, therefore, be indulged in ostentatiously by a chaste writer, nor employed in any case but as useful and expedient auxiliaries. Composition, to be good, like a good picture, must be free from every impertinence.

312. To measure periods, to distribute words in due rhythmus and cadence, to harmonise ex-

pression to the ear, by rendering the sound, as it were, an echo to the sense (and these with entire subjection to perspicuity), are perhaps the only licenses allowable in a pure logical and philosophical style. Naturally and happily, however, harmony of language and perspicuity of thought unite in favour of a philosophic style; which coincides with this universal philological maxim — that a just and felicitous appropriation of expression is the essence of a good style, consisting, as defined by Dean Swift, of nothing more than proper words in proper places, and flowing, like Denham's Thames,

> "Though deep, yet clear; though gentle, yet not dull;
> Strong without rage; without o'erflowing, full."

Which is itself an eminent example, and has been felicitously attributed to the diction of Plato. A good, or musical ear in the writer, is however indispensable, in all cases, to a harmonious and perfect style; as a correct comprehension, feeling, and a good voice, managed in a high, low, or middle pitch, according to occasion, are to its perfect delivery in reading or speaking.

313. Yet are not our precepts concerning the philosophic style, any more than are those of our philosophy itself, to be understood in an absolute, but only in a relative sense, because philosophy, however pure in its origin, form, and reason, has in

all its developements some illustrative matter of a memorative and imaginative character, and therefore involves in its delivery something *historical* and *poetical.* Hence, in every kind of writing, there needs some mixture and temperament of the three modes of style, and some call upon judgment, taste, experience, and practice, in adjusting them to each other harmoniously; nor ought the philosopher to reject absolutely, or contemptuously, all deference to custom and popularity: for beauty in itself, and even fashion, when they do not eliminate a higher purpose, are worthy to be regarded as objects of good sense and taste in a philosophic style.

314. We may, however, regard as maxims, that any employment of figurative language, or ornament, is illegitimate, when the matter to be conveyed is purely scientific, or philosophical; and that vice, in the philosophic style, is ever on the side of ostentation and tumidity: nay, it is even here, as in things material and artificial, wherever we observe an ornament we may suspect a defect. Nor is it, perhaps, less than a law of good taste, that the only plausible use of ornament is for the purpose of hiding a deficiency, or disguising a deformity.

315. Rigidness of style or construction will, nevertheless, be avoided by writers of mature taste when strict argument, or demonstration, demands

not undeviating signification, or sense, and when the severity of thought may be relaxed with advantage by a judicious, chaste, and significant variation of style; while extreme floridness savours of juvenility and effeminacy, as much as aridness and the total absence of the blossom do of age, unfruitfulness, and decay.

316. But, after all, the writer who expends his powers too anxiously upon words and construction becomes exhausted for thought, and negligent of the original matter of his work. Style is his matter, to captivate sense is his object; and he accomplishes his end without affecting, or reaching, the understanding of his reader: hence embellishment of style, admitting all its attractions, is, and ought to be, last in the literary office of the true Philosopher, in whose class we include also the Divine.

317. The philosophic mind, fraught to the full with thought, delivers itself in a style brief and comprehensive; on the contrary, a paucity of ideas, or knowledge, is the foundation of a verbose and tumid style. Readers, too, will receive either the one or the other with condemnation or applause, and betray the measure of their own minds in their judgments of the works of others.

318. The foregoing remarks are delivered solely with reference to what may be called the *literary styles*, which branch into many varieties,

all of which are addressed by writers invariably to the learned, in which the literary are distinguished from the *colloquial styles*, which employ the current language of a people; between which there is a third, or *illiterary style*, adapted to the illiterate, the perfection of which consists in the clear and forcible delivery of common sense in coarse expression; and it is a style of great power and compass, equally comprehensible by all minds, whether high or low, learned or unlearned.

319. Of these styles the last, being of widest application and the lowest in its aim, is also probably of easiest acquisition, and at the same time fittest, also, either for use or abuse. Its strength is hempen — the strength of coarseness, and not silken and refined: the perfection of language is, however, to be strong without coarseness, resembling the finest textures of the loom. The first and opposite style is the universal style of literature, in which writers addressing the learned with all their learning, and aiming upward, are below their object; while in the other, and less erudite manner, which addresses itself to the illiterate, and with a downward aim, the position of the writer is comparatively more elevated, authoritative, and commanding.

320. Such a style, addressed to the passions, is of great force, and when delivered in a confident manner, becomes oracular and irresistible to the

uncultivated, and ensnaring to the cultivated mind; for he who delivers falsehood with confidence, will obtain more attention and credence from the many than he who delivers truth with diffidence; and as confidence is generally assumed for maintaining error, and truth is usually attended by simplicity and diffidence, we have sufficient reason to be upon our guard against a confident eloquence of any kind: and as much so in literature as in oratory.

321. To the sensual variety of style belongs that of slang and levity adapted to banter and ridicule, which, however seasoned with humour and quaint wit, are to be regarded as degeneracies at variance with good taste and intelligence; and a judicious writer will equally avoid the degrading of his subject by a low style, as he will shun the ridiculousness of a false elevation.

322. Upon the whole it may be concluded, that the best general literary style is that which, without becoming either colloquial or quaint, taking a level and middle aim between the pedantry of the one extreme and the licentiousness of the other, delivers itself without excess of confidence or of diffidence, in a simple, unaffected, and pure dialect. But if we have dilated more upon this head than may seem consistent with the simplicity of outline, we could not well avoid some discussion of a subject so essential to right teaching and the

communication of knowledge, and so intimately connected with this first intellectual discipline.

323. To conclude: Language, which comprehends the entire subject of this outline, has three respects; the first, to words and construction, which is *grammatical;* the second, to figures of speech, which are *rhetorical and poetical;* and the third, to argument, or discourse, and this is *logical:* to the outline of which science we proceed.

OUTLINE III.

NOUOLOGY:

OR,

THE ANALOGY OF LOGIC,

INDICATED.

NOUOLOGY:

OR,

THE ANALOGY OF LOGIC.

INTRODUCTION.

324. NOUOLOGY, *Noology*, or *the science of mind*, or of the internal subject, is coequal with the universe itself, which is the object of all knowledge, or Philosophy. Our present outline, therefore, limits itself principally to *the discipline of mind*, the science of which is called *Logic;* because, having first traced the outline of our philosophic system in reference to nature and established learning, and, secondly, the philological outline dependent thereon, we proceed from words to thought, and, as a next step, to develope the outline of logic, upon which the whole depends: for these three we have shewn to be reciprocal and co-essential, and that hence neither of them can make great advances, much less attain perfection, independently of the others.

325. It has happened, nevertheless, at all times, and in the various progress of knowledge, that objective philosophy has taken the lead, and that the sister science of *logic*, in particular, has generally received little countenance from philosophers, while it has been scorned by the rest of mankind. Not, indeed, that it could be altogether dispensed with by either; but, being used as an instrument, it has not been valued for itself; or, being austere, erroneous, and licentious, it has lain in disrepute: while philosophy, thus left unsupported by a correct logic, has run into endless error and confusion.

326. Among the many circumstances and objections which have arrested the progress of logic, may be enumerated its apparent unprofitableness, since it supplies little positive knowledge — that it may be regarded as needless, since reasoning is a thing which lies so close to the nature of man that he seems to possess it as a faculty without art— that it is not to be trusted, because it has been more employed to confound and fetter than to enlighten and free the understanding—more for the purposes of falsehood than of truth; — and, above all, that its difficulties as a science, its few honours, and its many failures, have deterred adventurers: so that, for every single system of logic promulgated, the world has received a hundred in philosophy. Nevertheless, the improvers of logic are among the greatest benefactors of mankind; since, by

rendering man more reasonable, they render him more powerful, just, and happy.

327. But, though logic can neither furnish a man with faculties nor alone store the mind with information, it gives power and value by regulation to both, and is the touchstone of science and truth; nor is a valuable instrument to be rejected because it may have been unworthily or mischievously employed. And if logic, for these reasons, has of all sciences been the least cultivated and the most abused, it is, nevertheless, of the first importance, and the more calls for support, since the fidelity of inference, the force of conviction, and the legitimacy of every conclusion, depend upon an accurate logic: it is, therefore, indispensable, not only throughout all science, but in all the great affairs of life. Nor ought the chief of all *disciplines*, and that which lies at the root of all intellectual culture, to be deemed itself unworthy of cultivation.

328. It must be admitted, nevertheless, that literature, without excepting even the great works, the "Organon" and "Novum Organum," of Bacon and Aristotle, has not hitherto produced a work deserving the title of a universal logic, since *syllogism* is, for the most part, strictly conclusive only in the homogeneous relations of mathematical quantity, and fails almost entirely, or altogether, in physics and ethics; while the logic of induction, or *Generalogism*, however useful in natural philosophy and

the common affairs of life, or however necessary in judicial investigations, is unfruitful in pure ethics and the mathematics.

329. It is at the bar, and in the senate, that this latter form of argument has been chiefly and necessarily resorted to, owing to the very heterogeneous nature of judicial evidence and affairs of state; but it was considered as too loose and inconclusive for the stricter purposes of science till Bacon, influenced by the bent and practice of his profession, the habit of which he had carried with him into retirement, judiciously, and with discriminate sagacity, introduced the logic of the courts into physics, hoping thereby to build up the whole of philosophy, physiologically, upon the ground of a solid universal induction.

330. To induction, accordingly, we are indebted for an important reform in the study of nature, or physics, and for the means of adding greatly to the natural knowledge, numbers, and corporeal comforts of mankind: it has, notwithstanding, been of fatal influence in morals, wherein induction is of no theoretical, and of little other practical use, than to teach us how to counteract the fraud of others, and become ourselves expediently honest; while by placing ethics upon experience, and multiplying objects of power, pleasure, and contention, it loosens the bonds of society, robs man of the reliance on conscience, and undermines the authority of religion.

331. Thus, while modern philosophers, by the aid and example of the great Verulam, have corrected the errors by which the antients founded physics upon a basis entirely speculative, and have thereby wrought a great and obvious reform in every department of natural philosophy, they have themselves erred equally, and with an influence infinitely more fatal to the happiness of mankind, by founding moral and intellectual science upon induction; so that, should a check not be put upon its progress, there is danger that empiricism may usurp the dominion of mind.

332. This impulse of induction was, undoubtedly, determined by the abuse of the syllogistic process during the middle ages, and the absurd contentions of polemics, properly enough termed wrangling, in which the strength of argument was made to consist in resistance of evidence, and a fruitless logomachy; and also by the vain attempts of philosophers to establish the speculative, as well as the experimental sciences, upon syllogism, the force of which lies principally in words and a connexion with philological science.

333. Yet has the logic of induction, coupled with a tasteless rhetoric, been hardly less abused in the courts of law, than was that of the syllogism in the schools; in both of which natural reason has been subjected to artifices more successfully employed in defending falsehood than in disclosing truth.

334. It is apparent, then, upon the whole, that in the most important concerns of moral and intellectual science, neither of the foregoing *organs* suffice, and that they leave man without an authority for his judgment therein, or a rational guide for his conscience; whence the lamentable uncertainty and discordance which prevail in religion, morals, and metaphysics: upon which, perhaps, depend the too evident neglect of intellectual philosophy, and moral, political, and religious duty, notwithstanding our high state of cultivation, and advancement in the physical sciences and arts. The moral necessity of a THIRD ORGANON will not, therefore, be disputed, the more especially since there is a *third organ* peculiarly suited to moral science, the basis of all true ratiocination, and hitherto untried by logicians.

335. To raise logic upon its basis by the instrumentality of this third organ, is the principal design of the present outline, however insufficient it may prove, or however little attention it is likely to receive, while literary taste lies in an opposite direction. But since fashion revolves with the seasons, the time approaches in which this subject, and the philosophy connected therewith, will recover popularity, under a government philosophically constituted, and among a people at all times famed for thought. We do not hesitate, therefore, to claim for this outline the attention of those who do not measure by magnitude alone, nor estimate

that by its fashion or finish, the true value of which lies in its utility.

336. The principal mistake of logicians appears to have been that of leading us into the particulars and labyrinths of logic before they had mastered the general plan, or universal ground of the science. Even Aristotle, the father of logic, whose "Organon" is undoubtedly one of the greatest efforts of human intellect, is not free from this error. His genius and subtilty are unquestionable; but his readers require the powers and acuteness of the master to penetrate the mighty maze of thought into which his developements conduct.

337. Bacon, too, following his great prototype, has fallen into similar error in his "Novum Organum," and has led us into intricacies without having previously well established the groundwork of his method. Far from arrogating any other than the most distant and accidental comparison with these master minds, it may be questioned whether, while we censure their works, we have not erred more blamably in our attempt by running into the opposite extreme of elementary simplicity, and in not having aimed at a complete system of practical logic in the manner of these great logicians. With us, however, logic is subordinate to universal philosophy; and our end is accomplished if we have succeeded in disclosing its relations synoptically, and in indicating its true elements theoretically:

which being once established, the science may be more easily extended, and a right system of practice will soon follow, as a matter of course.

338. It has proved too often an impediment to the progress of science when eminent works have been established by great men, prematurely, upon partial and imperfect foundations. Works so established have been made standards to all future accomplishments; to question the authority of which, or to seek science upon other ground, has been stigmatised as unpardonable heresy: nor has it happened in such cases, till error has propagated itself into absurdity, that reforms have been accepted; and such has been the impendent fate of logic.

339. But, whatever may have been its defects and deficiencies, we need only compare the intellectual eloquence and method of the best authors of the seventeenth and beginning of the eighteenth centuries, founded upon the logical discipline of Aristotle, with the smooth and regular verbiage—the loose and sensual rhetoric of many succeeding writers, who have despised and neglected logic, sacrificed sense to sound, and science to popularity—to perceive at once the importance of this study, and the necessity altogether of enlarging our inquiries therein.

340. Nor can logic, however degraded and contemned for its failures, be dispensed with, nor cease to influence mankind; for reasoning is as

natural to the mind as exercise is to the body: and since thought governs action, by some kind of logic will the practices of man be ever prompted; and as philosophy itself is governed by the prevailing mode of thought, or reasoning, and the *syllogistic* art forged fetters for the mind, while the inductive, or *generalogical* logic, which still prevails, has turned the mind downward, and freed it even to licentiousness, we may reasonably expect a beneficial change, if it should hereafter be in the power of the *analogical* organ to give a new direction to the mind.

341. There is, indeed, no better criterion of the truth of any doctrine, or discipline, than the beneficence of its effects — nor any better proof of its fallacy than its evil influence; for if truth, as all allow, be not pernicious, we may fairly infer that that which any how is pernicious, is in some respect not true. Witness, in an ethical view, the moral discipline and effects of the doctrines of Pythagoras, Plato, Socrates, and, above all, that of Christ, compared with those of the Stoic, the Cynic, the Epicurean, and the Sceptic.

342. In representing Logic as a *Discipline* rather than as a *science*, or an *art*, and assigning it a position in the series of knowledge in advance of the two latter, it is apparent we do but follow a natural course, and act upon the example of the chief master of logic among the antients, whose work, the greatest ever produced upon the subject,

bears the title of "Organon," which was also adopted by the greatest of modern logicians for his "Novum Organum;" and the very name *of organ*, signifying an *instrument*, denotes a *discipline*. And since logic is a chief discipline, administering immediately to all knowledge, it demands a middle station, as the body of all disciplines: we have accordingly so placed it, by the present outline, in its natural position between Philology and the Mathematics.

CHAPTER I.

NOUOLOGICAL: OR, SUBJECTIVE PHILOSOPHY.

343. In our first and universal outline, the system of knowledge, science, or philosophy, is regarded, according to the natural habit and prejudice of mankind, as external or *objective*. In the present outline we regard the same system as *subjective*, or in reference to the mind, or internal; in which view we comprehend, therefore, the science of the human mind in its universal relations, or Nouology.

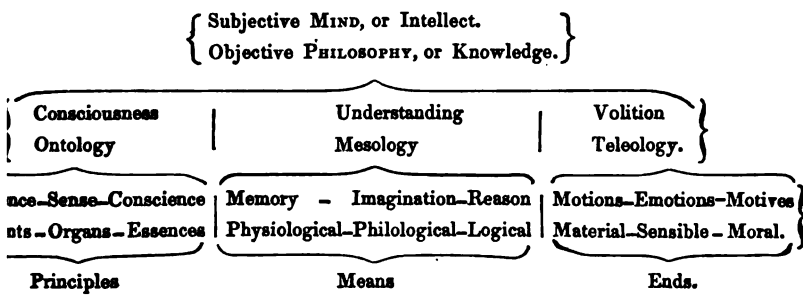
344. But as in this change of position from the objective to the subjective, and in every other, the relations of science remain the same under a variation of view only, it is merely expedient that we herein advert briefly to the first genera of science unfolded in our first outline, for the sake of connexion, and dwell more particularly on that branch which peculiarly refers to the mind, its faculties, and discipline; namely, the *logical* department of knowledge.

345. Yet the reflex act, by which the mind regards itself, is later attained, and more difficult, than the direct act by which it regards outward things; and hence the interpretation of its faculties and their relations is not only difficult of accomplishment to the mind, but also difficult of significant conveyance; for herein the *subject*, being also regarded as the *object*, *the view* becomes indistinct, and demands intent observation, reflection, and practice. Had we, however, a true and perfect objective system, wherewith the subject cannot but conform, these difficulties would be overcome; and it is upon such a view of the ground of knowledge that we essay to establish our logical outline in doctrine and discipline.

346. The primary genera of science, we have seen, are *Ontology*, or the science of being; *Mesology*, or the science of knowing; and *Teleology*, or the science of doing: and these, consequently, embrace all other denominations of science. But as all science is such only inasmuch as it refers to mind or intellect (of which to be, to know, and to do, are the sole comprehending attributes), and as *being* without CONSCIOUSNESS, *knowledge* without UNDERSTANDING, and *doing* without VOLITION, or will, have no meaning, so consciousness, understanding, and volition, constitute mind universally: consciousness being *passive intellect;* will, *active intellect;* and understanding, *effective intellect;* in which volition and consciousness concur.

347. It may be added, in conformity with our universal principle of developement, that there are three chief modes in each of the three principal faculties of the mind, or subject: to consciousness belong *existence, sense,* and *con-science;* to understanding, *memory, imagination,* and *reason;* and to volition, or will, belong *motions,* or appetites, *emotions,* or passions, and *motives,* or inclinations; and that in a logical, or subjective view, there are a *universal,* or philosophic mind — a *particular,* or technical mind — and a *general,* or logical mind; and that they severally refer to *science, art,* and *discipline,* throughout all their relations.

348. In fact, so precisely identical do we regard the whole field of subjective and objective philosophy, that, with little discordance of terms, both may be displayed upon the same ground. Thus: —



349. Ontology, then, comprehends all principles and powers — that is, all existence as belonging to consciousness; Mesology comprehends

all relations and intelligence as belonging to understanding; and Teleology, all purposes or ends, and good, as belonging to volition, or will.

350. We infer, hence, that existence and consciousness are inseparable, if not identical, in principle — that science and understanding are the same as means — that such, also, are volition and good, as purpose; — that these are the essentials of all known things, and coincide with the universal attributes of God — the essence of all — Omnipotent existence, Omniscient wisdom or understanding, and All-benevolent purpose, or good; and that, finally, God, the all-comprehending Spirit, and the spirit, or mind of man, are conformable; and consciousness, or conscience, in man, is the confession of his subjection and relation to God, who formed him in his own likeness.

351. In a subjective view, therefore, Ontology belongs to consciousness; Mesology to understanding; and Teleology to will, principally: we say principally, for the mind cannot act in any way without some concurrence of the three.

352. Of these the will, or practical intellect, has been regarded as merely ethical, or moral; but this, though principal, is by no means the whole to which this faculty relates, since it involves the entire sphere of Art, or doing, whether by physical *motion* in mechanic art, through sensible *emotion* in fine art, or through moral *motive*.

353. The above will sufficiently shew the

aspect of the mind with relation to the principal divisions of science: we need not, therefore, travel over again the ground of our first outline with regard to any other than that department of meso-logical science which refers subjectively to the understanding, namely, to *Logic.*

354. The *Understanding** is, we have seen, that portion of the mind, or internal, which is at once distinguished and inseparable from volition and consciousness, with which it constitutes the three concurrent powers of perfect mind. And it has, in like manner, three distinct reciprocal powers or faculties — *memory, imagination,* and *reason* — through which we understand,. in subordination, *facts, fictions,* and *relations;* and to which belong, we have seen, in like order and subordination, three distinct sciences, namely, to Memory, *Historics;* to imagination, *Poetics;* and to reason, *Dialectics:* the last of which is of internal relation and principal in Logic, being the whole, indeed, to which the widest common acceptation of the term logic extends.

* The *understanding* is that *hypostasis,* or personality, which *under-stands,* or is the foundation of knowledge, in which reason is pre-eminent. This is the English sense in which we employ the term, in common with Bacon, Locke, and the best English authorities. Abstractly and hypostatically, this faculty is the same as *active consciousness;* and it degenerates into *conceit* when it mistakes opinion and imagination for knowledge and reality, its proper office being to apprehend, or *conceive,* and to judge, or *conclude,* truly.

355. Thus, again, in subjective philosophy, as in the objective, there is an essential triplicity of parts, and a system of correlation throughout; so that not only whatever exists, but also whatever can be thought or known, is relative, and there is nothing absolute throughout the whole system of science.

356. Hence true philosophy, though ever the same in plan, presents a different aspect as the view changes, under which a new order and new denominations of its relations arise; so that, in all such changes, we do violence, as it were, to the original. Hence some dissidences in the details of universal philosophy — hence, also, the difficulty of attaining a perfect system, and the unavoidable confusion among arbitrary sciences and systems; for all which there is no other remedy than a perfect *representative system;* or, in other words, a system of *philology,* or language, perfectly analogous and conformable to philosophy, both subjective and objective.

357. When this shall be attained, there will be adequate means for conveying with ease and accuracy, as well as for conceiving truly, the entire arrangements of the universe, and of perfecting the plan of written science in conformity therewith; till which arrive, the philosophic mind must labour with penetration and good will, and with a flexibility of understanding that can bend the signification of terms to the view; nor can terms or signs

be more absolute than the thoughts and things they represent. The want of this flexibility of mind and language obstructs the discoveries of science, and occasions dispute, than which nothing can be more empty and puerile; for if the production of science be in error, the controversialist will be much more laudably and beneficially employed in putting something better in its place; which is, indeed, the only object of just criticism that the rational mind, seeking truth and avoiding error, can allow.

358. It is, above all, necessary to guard against confounding and perverting the functions of the mind. Of these *the will* too often exercises uncontrolled and unsuspected power over the understanding, — whence little reason or argument suffices to convince *the willing mind*, while all the powers of ratiocination and of truth are cast away upon the *unwilling;* since, according to the logical humourist,

> " He, who's convinced against his will,
> Maintains his own opinion still."

359. When the will thus usurps the office of the understanding, the mind inevitably becomes the slave of prejudice and passion, while the reasoning faculty withers through want of exercise. Hence the necessity, if we would preserve the mind sane, and free for the acquisition of truth, that we should subdue this mastery of *volition*, and engage

it with honest *consciousness* in the free service of *understanding*.

360. That man in community, as well as individually, is more determined by will than by reason or understanding, is evident to the commonest observer. Were it otherwise, there would be little disagreement of mind, and no need of laws and treaties; men and nations would then readily concur in acknowledging and doing only what is right and for each other's good; for reason and right are one when not vitiated by will, which is blind and obedient to passion and appetite, and all the persuasions of pleasure and pain allied to inclination, affection, and sense, and to every evil motive of the mind: to bring all which under the government of reasoning or understanding, for a good end, ought to be the chiefest aim in the cultivation and discipline of mind, individual and social.

CHAPTER II.

LOGICAL SCIENCE.

SECTION I.

361. HAVING shewn that the mind consists primarily of three powers, in conformity with the plan of the philosophic or objective system, and having spoken of them as distinguished; namely, of the passive power of *consciousness*, the active power of *volition*, and the effective, or concurrent power of *understanding*, to the latter of which knowledge and reason properly belong; we may set apart the two former coessentials as distinguished from the latter, while we determine in what it consists, and its reference to LOGIC in particular.

362. The universal rule by which the objects of science are distributed according to their correlative relations, as internal, external, and medial, belongs also to the powers or faculties of the subject or mind, in similar subordination; and hence, again, understanding, or the power of knowledge, has three subordinate faculties: first, principally related to the external, it has *memory;* in medial relation it has *imagination;* and in internal relation

it has *reason;* and to these belong relatively the three genera of logical science,—Mnemonics, or *History,* to memory; *Poetics,* to imagination; and *Dialectics,* to reason: of which, setting apart the two former, we reserve the latter, to which more particularly belongs the science of ratiocination, the art and discipline of logic.

363. Notwithstanding we thus set apart the consideration of the sciences to which the several powers of the mind are related, excepting only DIALECTICS, which belong principally to the power of understanding, and its chief faculty *reason,* it is evident, according to universal relation, that all these powers and faculties of the mind are variously coessential to all its acts and effects: it is expedient, therefore, in this view, that we extend our inquiry concerning them.

364. All knowledge is the effect of the concurrence of that which knows, or the subject, with that which is known, or the object; and, as man knows nothing more of objects than their effects, or facts, he having no power of transcending his system, so he is incapable of knowing any more of his own subject than its effects.

365. Now, as the elements of objective effects are powers, or efficients, which are either *active* or *passive,* the same also are the powers or faculties of the subject, which are memory, imagination, and reason; from which spring the effects or energies of the subject, and such are perception, conception,

and judgment; and, finally, from effects and energies spring other effects or operations of the mind or subject, and such are the modes or forms of argument. Logic involves, therefore, subjectively, the *powers or faculties, effects or energies,* and *acts or operations* of the mind or subject, each active and passive, of which in order.

SECTION II.

366. First of the LOGICAL FACULTIES of the mind. In analyzing knowledge objectively, we discover an external object, matter — an internal object, mind or intellect — and a medial object, sense, each of which may be resolved into action and passion; and they are the ground of three primary corresponding sciences — the material or physical, the sensible or esthetical, and the intellectual or ethical sciences; and with these the primary faculties and energies of the subject, and the faculties and forms of logic, must correspond or accord.

367. Hence the logical mind or subject, in concurrence with external or material objects, receives and retains perceptions or sensations, by its faculty of *memory,* which is passive in receiving, and active in recollecting, what has been received or thought; thus, memory is the receptacle of the particulars of sense and reminiscence or recollection, which are the matter of thought.

368. Again: by the concurrence of the logical subject with medial or sensible objects, which constitute the particulars with which memory is furnished, are formed images and conceptions, by a generalizing faculty called *Imagination;* which is passive in receiving or conceiving given images or ideas, as of a man, or a horse; and active, in reconceiving and composing them, as in the framing of the conception of a centaur.

369. Finally, by the concurrence of the logical subject with internal or intellectual objects are formed judgments and conclusions, through the conceptions furnished by the imagination from the particulars retained by memory, by a universalizing faculty called *reason;* and as memory is active in recollecting its particulars, and the imagination in reconceiving and combining, or generalizing them, so reason is active in recognizing and judging these according to universal relations, and passive in receiving with conviction.

370. As reason is the highest and principal power or faculty of the logical mind, and is of internal relation, so reason is more particularly an active faculty, and memory a passive faculty; while imagination is medial — equally active and reactive.

371. Yet are these various attributes and distinctions of the mind *not absolute, but relative;* for in every act and acquisition of the mind each of its powers and faculties are engaged; the original

powers of will and consciousness being essential to understanding; and of the subordinate powers of the latter, memory to collect, imagination to apprehend, and reason to recognise and judge, are coessential conditions of every thought or energy of mind.

372. And, with respect to their concurrent, or conjoint active and passive functions, which all these variously possess, it is to be remarked that these principles concur inseparably; for that which is passive *acts or reacts*, and that which is active *suffers* from the patient; whence not only the superior, but also all the subordinate faculties and functions of the mind, involve the relations of action and passion; to well-conceive and understand which identity in diversity and indissoluble co-essentiality of principles and relations universally, is the highest office of intellect, and the most conducive to knowledge or science.

SECTION III.

373. Secondly, of the effects or LOGICAL ENERGIES of the subject, which correspond, we have seen, with their faculties; namely, *perception*, with memory—*conception*, with imagination—and with reason, *judgment*; not purely, indeed, but proximately, agreeably to the universal plan of philosophy, and the method of nature. We distinguish that energy only by the term perception, in which

memory predominates; that by the term conception, in which imagination is principal; and that in which reason has the ascendancy, we distinguish by the term judgment.

374. The same reciprocation that pervades the principles and relations of the objective, prevails also in the subjective and logical systems; hence perception, which is principal in memory, is predominant in all the faculties; conception, which is principal in imagination, is predominant in all the energies; and judgment, which belongs to reason, is predominant in all the operations or modes of argument which are principal in Logic and Dialectics.

SECTION IV.

375. Lastly, in the LOGICAL OPERATIONS of the mind, or the modes or forms of argument, reason, the highest faculty, and judgment, the highest energy, are principal; and reason, the most active faculty by its energy, judgment, combines and arranges the conceptions formed by imagination from the particular perceptions received by memory, according to universal subjective forms, which concur with universal objective nature in the production of knowledge.

376. Now, universal objective nature, we have seen, is, according to its relations, *external, medial,* and *internal,* as the matter or objects of know-

ledge; and these correspond with the *particular, general,* and *universal,* as forms or relations of knowledge, which, being predicated of things, denote them *individuals, species,* or *genera,* the first logical distinctions of things, and the ground of all ratiocination, the science of which is *Dialectics;* which involves also *forms* and *matter,* to the first of which belong *the modes of argument,* and to the latter the *topics or subjects of inquiry,* which extend to all the distinctions of knowledge and science.

CHAPTER III.

DIALECTICS.

SECTION I.

377. As knowledge, or science, is the result of a correspondence and conformity of relations between the subject and the object, and as, throughout objective science, there is a uniformity of relations, so must there also be throughout subjective science, and the science of ratiocination, or DIALECTICS in particular, a corresponding uniformity of relations by which ratiocination or logism is rendered possible.

378. Accordingly, in the acts or operations of reason and logic there are *three organa*, or instrumental processes; the first of which is a mode or form of argument or ratiocination through *particulars*, which is called inductive, and might also be called historical; and its produce is some general truth. This operation may be called generalogical, or a GENERALOGISM, because it generalizes, rising from individua to genera, &c.

379. This mode, or organ, applies principally to that department of science which belongs to the external most particularly, namely, physics, and depends principally upon that faculty and energy of mind which corresponds also to the external, physiological, and objective, namely, memory and perception; and it is chiefly synthetical, ascending from particulars to the general, and through generals to the universal, whence its universality.

SECTION II.

380. Secondly, there is a mode or form of argument, or ratiocination by generals or media, which is called syllogistical, and its organ and operation a SYLLOGISM. This mode is adapted principally to that department of science which corresponds to the medial and representative, namely, to the philological and discursive, with which it is usually associated; and this mode depends upon conceptions which belong to the faculty of imagination, which corresponds also to the medial. It is antithetical, connecting the universal and particular by a general or mean; whence, its universality as a mode of argument.

SECTION III.

381. And, thirdly, there is another organ, mode, or form of argument or logism, dependent

upon universal relations, which mode may be called analogical, and its operation an ANALOGISM; and this mode is principally applicable to those departments of science which relate to the internal and subjective, namely, to the logical and ethical; and it depends upon the judgments of the highest faculty of the mind, Reason,* and it is chiefly analytical, descending from the universal through the general to the particular.

382. Without such a logical mode, there could be no adequate premises for philosophy, the universe, or God; in a word, there is no other way in which can be demonstrated those universals or categories upon which the validity of all logical conclusion must ultimately depend; and the profoundest metaphysical researches without this process can produce only subtile and ingenious visions, or imperfect and sterile philosophy, devoid of genuine science.

* We regard the terms *reason* [Ratio], and *relation*, as being, if not of one etymology, at least of the same import in logic: and reason here signifies that faculty by which the mind becomes cognisant of the relations of things and thoughts; and there is a remarkable consent and coalescence of the terms logic [λόγος], analogical and analytical, which meet here accidentally.

SECTION IV.

383. These three modes or forms of argument, logism, or ratiocination—the *generalogical*, or inductive; the *syllogistical*, or scholastic; and the *analogical*, or universal, comprehend all dialectical operations, consonant in plan and relation to the faculties and energies before enumerated upon which they depend.

384. But although there are thus various modes of ratiocination, there is but *one Reason;* and hence, that which is proved in one of these modes may often be argued and proved in the other: there being, however, no perfect conclusion in any case without a universal subsumption by the premises. It does not follow, therefore, that each of the modes is on every occasion equally proper or equally prompt in conducting to true conclusions; and herein lies the use of logic in directing us how and on what occasions to apply the several modes of argument and inquiry; while, by instructing us in the various forms and powers of ratiocination, it enables us also to analyze the arguments of others.

385. It is to be noted, also, that these distinctions of modes are by no means absolute, neither of them being independent of the others: hence, they reciprocate and compound; and it is to this reciprocation (to express which language is inadequate, owing to the want of true

relations in the significations of words), that we are to attribute the difficulty of conveying, and, in some measure, of conceiving, this systematic ubiquity, in which no part is absolute, but all is relative. It is sufficient, however, for the present, if the foregoing has evinced the conformity of Logic with Science in general, as delivered in our first outline.

CHAPTER IV.

ANALOGISM.

SECTION I.

386. Having determined the position of Logic, and marked the relations, faculties, and energies upon which its operations, modes or forms of logism or ratiocination depend, we proceed to investigate these latter more particularly; and first and principally the ANALOGISM or Analogical process, or logic of universals, since it is the basis of the other modes, and appears to have been hitherto unattempted, and to be a *third organ* requisite to the entirety of the science, discipline, and practice of Logic.

387. By *Analogy* [Ἀναλόγως], we here understand equality or reciprocality of reason, ratio, or relation, for reason and relation are the same; and by the term ANALOGISM we denote a form of logism, or mode of ratiocination, from equal reasons or reciprocal relations; through which we descend in subordination from universal relations, through the general to the particular, transcendentally and analytically; and upon this principle or law, that to

the relations or reasons of the universal and genus belong also the relations or reasons of the species and individual.

388. Upon this depends all ratiocination; for if there were not such universal relation and subordination in the nature and constitution of both thoughts and things separately and reciprocally, in vain should we attempt to reason or inquire concerning them; for then all would be confusion of thoughts and confounding of things, or a chaos of thoughts and things.

389. Hence the validity of the premises in all the modes of ratiocination depends upon their exhibiting, in adequate terms, the true relations of thoughts and things; and hence it becomes a universal logical axiom, equally applicable to each of the modes, *that the conclusion is no further valid and true than are its premises, and proves no more than they truly contain or imply.*

390. To *conclude* and to *include* are, therefore, logically synonymous; thus, in the judgments of necessary relation there is a reciprocal conclusion of the correlatives; as the conception of father and son mutually include, and therefore conclude, each other reciprocally; nor have we a single idea or thought that stands alone or independent of relations, and we may in all cases assert truly such essential relations, and conclude logically whatever the admitted or given premises truly include, and no more. It does not follow, nevertheless, but

that true conclusions may be drawn from false premises, if the latter are wide enough to contain them; although it is the admirable property of truth that falsehood (which owes all the force it ever has to some sort of connexion with truth) does not spring from it in any case.

391. Hence, all logical evidence rests originally upon that analogy, or universal relation, wherein the subjective and objective systems coincide and concur, and thereby render knowledge uniform, consistent, and conclusive; and thus the *analogical process* is at the foundation of the other modes.

392. It is not, however, to be wondered at that this process should not have been early unfolded; nor ought we to expect its perfect developement in the commencement, because it depends primarily upon a perfect developement of the universal objective system, of which, at the same time, it must be the principal means; whence it depends, also, upon a like perfect developement of the universal subjective system, or of mind; and these may serve to explain why a thing so evident as *reasoning by analogy*, and so common in its discursive form, should yet have produced no attempt to discover its laws, and reduce it to science, in the manner of the other modes. Something will nevertheless be accomplished, in the disclosing of a principle and making a right beginning; for these, as the first and greatest of logicians

has remarked, are not only the chief, but the most difficult parts of a performance.*

393. Although the *analogism* is hardly in any form recognised as a mode of Logic, and not at all as a legitimate organ, it is nevertheless of the commonest use, all the illustrations of argument and discourse consisting in comparison and analogy; and it is owing, perhaps, to this very reason, that it is not so regarded. On the other hand, *the syllogism*, which is of all the modes the least natural, and is a disclosure of extreme art, has been generally regarded as the almost sole instrument of logic; yet the essential difference of *analogical reasoning* from the *syllogistical* and the *inductive* has been universally admitted by logicians; we, therefore, innovate little in logic by treating it as a distinct organ.

394. Analogy, as a manner of reasoning, could not escape the penetration of Aristotle, nor the sagacity of Bacon, who have, accordingly, each just noticed and named it; not, however, in its correct and universal sense, for which an adequate basis was wanted, but regarding it, not as necessary and demonstrative, but as fictitious and illustrative, both these and succeeding writers and logicians have employed the term rhetorically, and not logically, in the confined acceptation of *similitude*.

* Aristotle, at the end of his "Soph. Elenchi."

395. Aristotle was undoubtedly aware, also, of the necessity for a universal basis to the validity of the syllogistic process, and accordingly attempted to found it upon the *Categories*, predicaments, universal genera, or philosophical arrangements of the Pythagoreans. Nor is such a basis less essential to confirm the conclusions of the generalogism or induction of Bacon, since that also owes its entire force to the degree of universality in the assemblage of its members or particulars.

SECTION II.

396. The Categories, as collected by Aristotle, and delivered at the beginning of his "Organon," or logical treatises, are 1. *Essence* [Syn. entity, existence, being, substance, subsistence, substratum, matter, self-sufficience, and thing absolute]; 2. *Quantity;* 3. *Quality;* 4. *Relation;* 5. *Space* [place and where]; 6. *Time* [when]; 7. *Position* [situation, figure]; 8. *Possession* [to have, or habit]; 9. *Action;* 10. *Passion* [reaction, resistance]: and their genealogy may, perhaps, be correctly exhibited in the following analytical table:—

1. ESSENCE —

2. QUANTITY —	3. QUALITY —	4. RELATION —
5. Space — 6. Time	7. Position — 8. Possession	9. Action — 10. Passion;

COROLLARY.

Whatever *Exists* is either *Quantity, Quality,* or *Relation.* The most universal *Relation* is that of

Action and *Passion;* the most universal *Qualities* are those of *Possession* and *Position;* and the most universal *Quantities* are *Time* and *Space.*

397. And this distribution of the Categories is authorized by the Stagyrite and his followers, who regard Essence, or Substance, as first and chief among the categories, and Quantity, Quality, and Relation, as of secondary importance; the others are consequently subordinate to these.

398. It is to be remarked, however, that the *Essence,* or primary matter of things and thoughts, as the necessary condition of knowledge, must be in itself unknowable, and that Quantity and Quality are *Relations;* and upon these the other Categories depend. Hence relation and essence, or *the relative* and *the absolute,* are the most universal, or first categories.

399. Things may, therefore, be considered as *known,* or as *existing;* and since nothing can be known but *relations,* the next universal genera of things (or predicaments) are those universal relations to which they may be referred in our knowledge: we err, therefore, when we regard knowledge as comprehending *the absolute* in things, notwithstanding this is an error more vulgar than that of regarding as real the apparent or relative diurnal motion of the sun. It follows, hence, that all our conceptions of things as *absolute,* or independent of the mind, are but figurative, or ectypal; and that all our real

and archetypal conceptions belong to the mind as RELATIONS.

400. It is by mistaking these figures and copies for absolute things and original causes, that men run into errors and absurdities in their rational or relational inquiries, and substitute poetry for philosophy, to the great obstruction of science, virtue, and happiness. The personification of God, by which He is *figured* to the belief of millions as a Mighty Ruler, gifted with all knowledge, and armed with all power — seated in the heavens above our earth, and looking down with an all-piercing eye, &c. — (although it be sublimely poetical, and true by remote analogy, or it would be neither beautiful nor impressive; and although it may occasion negative virtue, through fear in those who possess and exercise sense without understanding), will yet fail to produce that true regard for virtue which is free, and founded on intelligence, and that *rational love* by which man is elevated, through *relation* to true religion and his God. But, on the contrary, the free mind of man, seeking the *absolute* of this figured being, and finding therein no *sensible* reality — and yet unacquainted with those universal relations, conducted by which it is analogically demonstrable — consigns the idea altogether to the delusions of imagination, or the fraud of priests and politicians, and plunges, but too conclusively, into the mental degradation of infidelity or atheism.

401. ESSENCE and RELATION, or the absolute and the relative, are, then, the only perfect *subjective universals or Categories,* comprehending all others; and they are necessary, universal, coequal, and correlative conditions of knowledge, analogically demonstrated; and they coincide with the *philosophical universals, Existence* and *Science,* which are of objective, as the former are of subjective reference: in the one, Existence or Essence is the prime category; in the other, Knowledge or Relation.

402. This agreement of the objective and subjective systems extends also to the representative system; for the *Philological universals,* or first genera of words or signs, are the *Substantive* and the *Relative,* or attributive; and thus *words, thoughts, and things,* coincide and concur categorically in all our knowledge.

403. And these Categories or Universals, *Essence* and *Relation,* have coequal and corresponding *Ends or purpose;* which, again, coincide with our philosophical universals, and also with the first position of our philosophy, in which we define a system to be a united variety of parts or *principles* co-ordinate or *related* to some end or *purpose.* With these, also, the subject, predicate or attribute, and conclusion, and the three terms, major, minor, and consequent of logic, correspond.

404. In what other manner these Categories comprehend the universe, has appeared also in

our first outline, together with the genera and species dependent upon them; namely, the *External,* or Physiological; the *Internal,* or Nouological; and the *Medial,* or Philological, &c.: nor is there any end to their coincidences.

405. Further, if *Quantity* be of material or external reference, *Quality,* of sensible or medial reference, and *Relation,* of intellectual, or internal reference, then do we also agree with the Antients in their subordinate categories; for *Time and Space* comprehend all external or material quantities, as *Position and Possession* do all medial or sensible qualities, and *Action and Passion* all internal or intellectual relations: and, notwithstanding the equivocalness of the antient categories, this appropriation is so suitable and easy, that we may reasonably consider them as the relics of a more antient and similar philosophy.

406. At all events, the true source and genealogy of the Categories have been unnoticed, and, as far as appears, were unknown to Aristotle himself, who is said to have borrowed them from Oculus Lucanus, and Archytas, the Tarentine; who, again, founded them upon the Decalogue of Pythagoras, called also the Table of Alcmœon: and as Pythagoras drew his philosophy from the Egyptian and Eastern sages, and modern researches into the antient literature of India and the East have disclosed doctrine consonant to the Categories, there

is reason for referring them to a time and country more antient and remote than Greece.

SECTION III.

407. Having thus shewn the necessary, universal *analogical basis of all ratiocination,* and the manner in which these universals coincide with, and comprehend, the Categories upon which Aristotle rested the validity of the Syllogistic process (for the hypothetical and disjunctive syllogisms resolve into the categorical), we may proceed in our attempt to develope the instrumentality of the ANALOGISM, the fundamental organ of logic.

408. Since, then, all reasons are relations (which are the sole matter, or substance of logic), and since correlatives demonstrate each other immediately, or by necessary inference, and imply equality or reciprocalness, analogism concludes from the equal reasons or relations of things immediately and essentially, or from known relatives deduces their less known correlatives.

409. And as universal relations comprehend a subordination of particular relations, so the universal analogism comprehends a like subordination, both of which are unfolded by analysis. We therefore distinguish analogisms as *universal* and *particular;* and these, again, we divide into *single or simple,* and *general, plural or compound.*

410. And as the premises upon which the first are framed are necessary and universal, and those of the second, or particular, may be in themselves arbitrary or granted, the first are *Categorical*, and the latter may be called *Hypothetical;* between which lies the popular or general analogism, which concludes from parallel relations and similitudes: and this may be called *Disjunctive* and conjunctive.

411. In this the Analogism resembles the Syllogism, that it is either categorical, hypothetical, or disjunctive; and it resembles the syllogism herein, also, that the two latter of these, the hypothetical and disjunctive, resolve into the first, or categorical; and they both terminate in the identification of relations.

412. And, in their application, the Categorical Analogism is *theoretical*, and principal in intellectual and ethical science; the Hypothetical Analogism is *practical*, and principal in material and physical science; and the Disjunctive Analogism is *discursive*, and principal in sensible and esthetical science.

413. As the *Categorical Analogism* comprehends all *necessary relations* traceable to universality, all necessary relations, whether universal, general, or particular, are by reference categorical; so the *Hypothetical Analogism*, formed upon assumed, or *possible relations*, may be either universal, general, or special; and so also the *Disjunctive Analogism*, which argues from parity of

reason, or *probable relations*, lies between the categorical and hypothetical analogisms, and may also be universal, general, or particular, for of these distinctions there are no definable limits.

414. Hence, we analogize *categorically* only on necessary relations; *hypothetically* on assumed, probable, or conditional relations; and *disjunctively* and discursively upon parity of reason, or possibility of relations, or by similitude.

415. Yet analogy, to become logically conclusive, must be between things of the same nature, or homogeneous: thus, for example, we cannot conclude through any real parity of reasons, from the doctrine of sounds produced by vibrations, that colours, or other objects of sense, are also produced by vibrations, because these things differ in nature, or are heterogeneous.

416. Of these three forms we will speak, first, of the *Categorical, or theoretical Analogism;* next, of the *Hypothetical, or practical Analogism;* and, finally, of the *Disjunctive, or discursive Analogism.* And first, of the first.

SECTION IV.

417. The CATEGORICAL ANALOGISM, from two coequal relations, or extremes, infers logically, or concludes their equal mean; and again, by analysis, it takes, of the concluded mean, two other equal extremes in evidence of another included

mean relation — thus descending from the universal and general through the less general to the particular; and as the extremes and media in this process are in equal relation, or strictly analogous, and therefore reciprocal and simultaneous, either of the three terms may become extreme, or mean, to the others reciprocally. Hence this Analogism is a triple syllogism, comprehending three syllogisms, or particular conclusions, under a general and universal dependence, and is hence of irrefragable strength.

418. Thus, for example, the *subject*, or that which perceives or sees, and the *object*, or that which is perceived or seen, are equal terms or extremes, and they imply or include the perception, or *view*, in which they concur; and these three,—the subject, the object, and the view,—are co-essential, and, by implication and logical inference, conclude each other reciprocally. They argue in a universally coincident circle, as major, minor, and consequent: they include, and therefore conclude, as irresistibly as the most perfect syllogism, each depending upon correct premises. And this may serve as example of the *simple or single analogism*. Further —

419. Between the *philosophic mind*, as subject, and the *philosophic universe*, as object, lies *philosophy or science*, as view, in like reciprocal relation and coincidence. Take, now, either member or premiss, of this analogism, for example, phi-

losophy or science, and separate its extremes, namely, *physical* and *intellectual science*, between which, according to the same universal reason, or category of relation, lies *sensible science*, as a mean; and so on, again, with either of these terms and their subordinates, in search of particular knowledge, or science.

420. And this is an example in the first stage of the *compound, or plural analogism*, which may sufficiently indicate the *Categorical, or Universal Analogism*, in this place, since the preceding and following outlines afford extended examples, and are replete with instances of its application.

421. As the Analogism, to be perfect, must consist of parts, members, or premises, which, taken together, contain neither more nor less than the whole of their subject; and, as it requires co-equal extremes in evidence of an equal mean, it is principally applicable to intellectual science and universals, in which these complete and necessary relations are principally found. And the highest, and most important of all the applications of the universal form of the Analogism is that in which it rises to subjects purely intellectual and divine, to subjects purely ethical and theological — the spirit of man, and the Spirit of God; — subjects concerning which the analogism can alone afford satisfactory logical conclusions.

422. Yet the analogism descends with proportionate degrees of evidence to the minutest particu-

lars of nature and science, of which we have given extended examples synthetically in our Chromatics: the analogism is, however, chiefly analytical. And as Generalogism, or *Induction, is the artificial procedure toward theory or science synthetically,* so is *Analogism the true scientific procedure in the researches of practice, or art, analytically.*

SECTION V.

423. Accordingly, in the HYPOTHETICAL, or PRACTICAL ANALOGISM, we assume two extremes in search of a mean, or particular. It differs from the Categorical Analogism in this, that its extremes or premises are not necessary, but conditional or arbitrary; and it is best exemplified in the adjustment of proportions: for example, let us assume, or determine the terms $\frac{4\ A}{1\ B}$ and $\frac{1\ A}{4\ B}$ in a chemical compound to be the *extremes* of a required *mean,* or effect; then, in search of such perfect mean, try the following:—

Proportions —

$$\frac{4\ A}{1\ B} \qquad \frac{2\ A}{1\ B} \qquad \frac{1\ A}{2\ B} \qquad \frac{1\ A}{4\ B}$$

Approximate Extremes.

New Media —

$$\frac{3\ A}{2\ B} \qquad \frac{1\ A}{1\ B} \qquad \frac{2\ A}{3\ B}$$

and so on to other media.

424. If a more perfect mean be required than either of the new media affords, proceed, in like manner, with the two nearest to it as new extremes to the mean, or particular sought, and so on till it be attained; or, if the required mean lie toward either of the original extremes, then pursue the same course with that and its approximate term; and so on to the end required.

425. It is here evident that the *hypothetical, or practical analogism*, treads upon the limits of Induction or Generalogism; in further illustration of which, and of the practical application and advantages of this mode, suppose it be required to accomplish any new purpose, or improve any process of art, we first generalize or generalogize the particulars and means our knowledge of nature and art may afford toward such end, and assume the most eminent means or process induced, as the basis of our analogical procedure, designated by A, fig. 1, &c.

Fig. 1.

We then vary the adopted process in its extremes and mean B B B, fig. 2, &c. The same with the most successful of these terms, setting apart the rest, as C C C, fig. 3. This, again, we analogize in like manner, and so on. The same with every particular of the process.

Fig. 2.

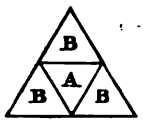
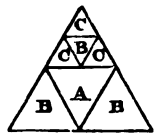
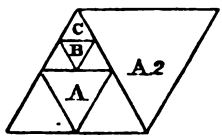


Fig. 3.



If we fail in every ramification of this branch, we return to our first position, and upon new ground pursue a similar course, A 2, fig. 4, and so on till we succeed in accomplishing our purpose.

Fig. 4.



426. Thus we may survey with accuracy the entire ground of our subject by an *inductive analogy*, wherein, knowing the bearings as we go, there is neither danger of running repeatedly over the same ground, nor of wandering in a labyrinth, as he does who operates at random; and if, in the search of a particular in infinity, this procedure prove sometimes tedious, it is, notwithstanding, ultimately the shortest and surest, provided we take our ground according to the full breadth of our subject; and, that we may not waste our time and powers in the unnecessary breadth of our survey, demands knowledge concerning universals, and experience with regard to particulars.

427. Notwithstanding the practical analogism

resembles the generalogism or induction in the assemblage of its members or particulars, that is, in its matter, it is essentially different and distinguished therefrom in its form, which consists *in seeking a particular, or individual, among a variety;* while, in every induction, *a general is deduced from particulars:* these modes are therefore antithetical, or opposed.

428. We might expatiate on the extent and variety of the practical analogism, of which our applications in other places may serve as illustrations; but our present design is not to particularize, but to distinguish the analogism as a universal mode: it should, however, be remarked, that the *hypothetical, or practical analogism,* is a mode not so much of reason as of experience, and therefore its logical evidence is proportionately less perfect and less logically conclusive than that of the *categorical, or theoretical analogism,* upon which it is founded, and which belongs primarily to reason, and concludes necessarily. Between these, as extremes, may be inferred an infinite analogical series, varying in degrees of evidence, and variously dependent on reason and sense, or experience.

SECTION VI.

429. Finally, the DISJUNCTIVE, or DISCURSIVE ANALOGISM, which lies between the Categorical and

Hypothetical modes, argues from parity of reasons, or possibility of relations, which are dependent on the original systematic uniformity of things.

430. This process is so common under the phrase of *reasoning by analogy*, that it needs not an example; and it is the mode in which the logic of analogy has been alone recognised, and to which it has been almost exclusively confined; being a form of ratiocination extremely popular, and of vast rhetorical use: for the analogies and similitudes of things, owing to a latent sentiment, or consciousness, of universal relation, which belongs essentially to the mind, become delightful to the imagination, and flattering to the judgment which recognises them, when, in the same case, the induction would prove laborious, and the syllogism dry.

431. It has, however, been urged, that the discursive analogism illustrates without proving; but, since it depends originally upon universal relations, it proves in proportion to the intimacy of relation it discloses in the premises: hence this mode is conclusive when the relation of comparison, or analogy, lies in nature, and is sophistical, or illustrative only, when such natural relation is wanting. It is, accordingly, of greatest force when the subjects or premises compared are homogeneous, or lie near together in the system of things; and it is proportionately of less force, or null, when the

relations of its subjects lie more remotely, or not at all, in nature.

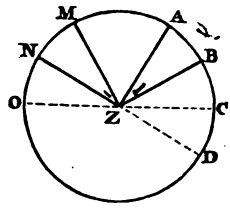
432. The Discursive Analogism is then only perfectly conclusive when the coincidence it discloses can be traced to universality in things of the same nature; and such it is mathematically in the determination of ratios and analogous quantities or proportionals, which are justly considered by Barrow as "drawn, not from any induction, but from a universal discursus."*

433. Of this, among other examples, and much to the purpose of our argument, he gives us the following:—"Let there be a circle whose centre is Z (fig. 7), and two angles at the centre, A Z B and M Z N, standing upon the arches A B and M N; let any multiple of the arch A B, suppose the triple A D, be assumed, and let Z D be connected. It appears, from the third element, that the angle A Z D is also triple the angle A Z B. Then let any multiple of the arch M N be taken, suppose the double M O, and let Z O be connected. In like manner it appears that the angle M Z O is double the angle M Z N. But if the angle A Z D exceed the angle M Z O, from what is demonstrated in the third element the arch A D will also exceed the arch M O; and if that equal that, also this will equal this; and if a defect be there, also a defect will be here. Therefore it is

* Math. Lectures, p. 394.

shewn that the said condition agrees with these quantities by a certain *universal* [analogical] *demonstration.*

Fig. 7.



434. The like reasoning holds in numbers, motions, and in every homogeneous subject. Thus, in arithmetic, the rule of three, commonly called the golden rule, depends in all its variety upon this species of analogy, and its results or conclusions are, for the reasons given, logical and perfect; indeed, the whole of arithmetic, inasmuch as it is a science of *ratio*, depends upon this mode.

435. The Disjunctive analogism, neither building immediately upon universal relations, as the Categorical analogism does, nor borrowing its premises from induction of sense or experience, like the Hypothetical analogism, but arguing from similitude, occupies the ground between the two latter modes, whence its vast application and extent; and hence the reason why it has been regarded as exclusively analogical. Lord Bacon's doctrine of *conformable instances* may serve as a further illustration of this mode, or form of analogism.*

* See "Novum Organum," Part ii. sect. ii. Aph. 27.

436. Having thus briefly distinguished the primary forms of the Analogism, we might subdivide these as variously as the other modes have been by logicians. It is, however, highly expedient, in the commencement of every science and every discipline, to preserve simplicity, and, regarding all integral, arbitrary, remote, irrelative, and trivial distinctions, as subversive of science, to employ such only as are founded on nature and universal analogy.

437. We proceed, therefore, to a like brief description and analysis of the Syllogism, already more than amply detailed in the justly celebrated "Analytics" of Aristotle, and the commentaries and compilations of other logicians.

CHAPTER V.

SYLLOGISM.

SECTION I.

438. THE *Syllogism*, or middle process of Logic, *demonstrates hidden or remote relations, by a mean or medium common to them as extremes;* or, in other words, it shews that some *particular* is comprehended in some *universal*, because it is comprehended in some *general*, or medium, which is also comprehended in the same universal; as two things related to some third thing must also be analogously related to each other.

439. Accordingly, every perfect syllogism consists of three members, which logicians distinguish by the terms major, minor, and consequent; which three terms [a, b, c,] are interchanged in pairs, in the three propositions of every syllogism.

440. For example, we may conclude syllogistically that the great Aristotle was fallible, thus:

Major — All men [b] are *Fallible* [a], — Universal extreme,
Minor — Aristotle [c] was a *Man* [b], — General medium,
Consequent — *Aristotle* [c] was Fallible [a], — Particular extreme.

Or, what [b] is, is [a]; and what [c] is, is [b]; therefore what [c] is, is [a] also; whence [a, b, c,] are identified, or subsumpted, under the same universal.

441. The *predicate* of the conclusion, or con-

sequent [fallible, a], is denominated the major, or universal term; the *subject* of the conclusion [Aristotle, c] is the minor or particular term; and the *middle, or general term* [man, b], connects the major and minor in the consequent, or conclusion.

442. The *major proposition* is so called because it contains the major term; and the *minor proposition* is so called, because it contains the minor term. Some ambiguity arises hence, because *the middle term and the middle proposition are not usually coincident:* we consider it preferable, therefore, to distinguish terms and propositions respectively as *universal, general,* or *particular:* more especially so, because any error in the argument depends upon the irrelation of these, and becomes immediately apparent in reference to them.

443. The consequent of the above syllogism may be concluded of all the particulars and media comprehended under its universal proposition, according to the axiom, that whatever is affirmed or denied of the genus may be affirmed or denied of its species and individuals also. Thus:

Universal	*All men are fallible,*	
	Philosophers are men,	
	Philosophers are fallible,	
General	The Peripatetics are philosophers,	
	The Peripatetics are fallible,	
Particular ..	Aristotle was a Peripatetic,	
	Aristotle was fallible.	

444. The above is an example of the paren-

thetical or *compound syllogism, prosyllogism, and sorites,* as the former is of the *simple syllogism.* The *elliptical syllogism, or enthymeme,* is that in which either the universal term or the medium is implied, though not expressed; as, for example:

Since *all men are fallible,*
Aristotle was fallible.

445. There are thus in every syllogism three propositions, enunciations, or judgments; a universal, a general, and a particular, expressed or understood; and each of these propositions is in like manner constituted of three terms, or conceptions of relation, similar to the above, and called the *subject, predicate,* and *copula.* For example:

Subject, — *all men* — universal;
Copula, — *are* — general;
Predicate, — *fallible* — particular:—

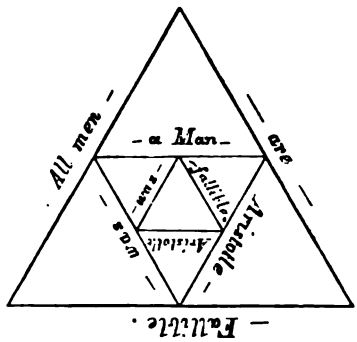
the same of the others also.

446. Finally, if we descend the last step of logical analysis — that is, to the analysis of *words* or conceptions which constitute the *propositions* of which the *syllogism* is constructed, or, in other words, to *the definition of terms* — we must also disclose their *particular* reference to the *general* and *universal;* or what (in the language of Plato, Aristotle, and the Logicians) is the same thing, we must determine their genus and specific difference respectively.

447. According to this analysis of the syllo-

gism, it appears that it consists of *terms, propositions,* and *argument;* and that each proposition consists of three terms, and every argument or syllogism of three propositions, which may be represented in their triple relations upon three inscribed triangles, thus:

Fig. 9.



448. Thus, the syllogism is a *compound proposition,* or judgment, in which the *particular* is included in the *general,* and both these together are included in the *universal.* And we have here traced the syllogism to its elements, which are terms and propositions logically, as we before ascended to it from their elements philologically; the only difference here is, that that which was a *name* or a *sentence* with respect to words, is a *term* or a *proposition* with regard to thoughts. The proposition and the syllogism both denote relation, or necessary analogy; the proposition being a sentence which expresses a simple relation between at least two words or terms, as a syllogism is the

expression of the compound relations among terms and propositions.

449. The above is the sole principle of the *syllogism;* and to it each of the *three Figures* and their *modes,* into which syllogisms are distributed, are reducible: the variety of the figures depends upon the transposition of the subject, predicate, and medium, which are the three essential terms of the syllogism, as they are also of the simple proposition.

450. The *simple proposition,* or judgment, is accordingly also distinguishable into figures and modes, according to the manner of its including the subject in the predicate, or of excluding it from the predicate.

451. On the other extreme, the *compound syllogism,* prosyllogism, or sorites, might also be similarly distinguished; and these are the three members of discourse.

452. Hence, the three *figures* and their *modes* consist only of the several possible interchanges of the three terms and their propositions; and this is common to them all, that the minor and major terms, though variously excepted in the premises, are posited uniformly in the conclusion: all of which is very mechanical, and of greater curiosity than use, except in the way of illustration and exercise of the logical faculty.

453. And this variety of distinctions in propositions and syllogisms is of very little either theo-

retical or practical importance, and resolves wholly into the analogical principle of comprehension, subsumption, or inclusion in the premises, upon which all ratiocination is founded; for the truth of a proposition, syllogism, or train of reasoning, depends upon the subordination of relations in the subject and predicate throughout.

454. By this principle or rule alone we may form a correct judgment of the validity, invalidity, or degree of value in every argument, whether it belong to the syllogism, analogism, or generalogism. As, however, analogism is the logic principally of *thought*, and generalogism is that of *things*, so syllogism is the logic principally of *words and signs*, and is therefore dialectical and discursive; hence its philological, rhetorical, and grammatical alliances, as the middle member of discourse; and hence, also, its mathematical connexion.

455. Since the syllogism is no further stable and conclusive than are its premises, we may go on questioning the premises, and the premises of the premises, till we arrive at that which is absolutely *primitive or universal*—the because, relation, or reason of the whole; and if such universal basis is not to be found for the premises, the conclusion falls of course, and the syllogism becomes a *sophism*. Or, to speak as a logician, the fallacy of a syllogism is generally in the universal, or major proposition; for if it be either in the minor, or middle proposition, it is easily detected.

456. It may be questioned, indeed, whether every syllogism is not sophistical, under the class of *petitio principii*, since it takes that for granted in the universal which is to be proved in the particular. So long, therefore, as the true universals upon which all syllogistic conclusions depend are wanted, will the science of syllogism combat with nearly equal force in favour of truth or falsehood. To establish these is the office of philosophy, and was the aim of Aristotle in his treatise on the "Categories," of which we have already shewn the relations and dependance in another place; the Analytical table of which, with the previous synoptic table, may serve as illustrations of the prosyllogism in extended forms.

457. Syllogisms are not only divided into the three *figures** and their many *modes*, and into perfect syllogisms, enthymemes, and sorites; they are also distinguished as categorical, hypothetical, and disjunctive. They are yet more eminently distinguished as affirmative and negative;† between which is the relative, which subdivide into particular and universal; to which, for completeness, should be

* Aristotle admits only *three* figures; Galen added a fourth, which other logicians, again, have disputed.

† These terms are relative and convertible; for that which affirms implies a negation, and that which denies affirms; *relation* is therefore concurrent with *affirmation* and *negation*.

added the general:* which three latter are denoted by the articles or signs, *one, some, all.* There are yet other distinctions; into all which we need not enter, since it is of practical reference only, and amply unfolded in the "Organon" of Aristotle, and the works of other logicians.

458. We have thus indicated the general and distinct nature of the Syllogism, and rapidly trodden back the synthetical path of the Stagyrite; who treats first of *Terms,* in his treatise on the "Categories" — then of *Propositions,* enunciations, or judgments, in his "Book of Interpretations" — and, thirdly, of *Syllogisms,* in his "Analytics," to which we refer.

459. Yet the synthetical plan, however necessary and well-suited to the design of Aristotle as a practical discipline, is always obscure in point of doctrine; and though it may conduct upon solid ground, it leads us, notwithstanding, in the dark. Analysis, on the contrary, encompasses and en-

* The terms particular, general, and universal, have been strangely confounded; *Particular* (which properly expresses individuality) having been employed to denote also a general or comprehending nature; and the term *general* (properly signifying a united plurality, or that which comprehends several, or many individuals), having been used to express *all-comprehendingness, or universality;* which, again, has been employed to express any general unity — a corruption to which these terms have been subject, in common with other correlatives.

lightens its whole subject, and is the true doctrinal method.

460. As universals can alone be proved *analogically* (for universal by induction is impossible, and it cannot be concluded syllogistically), and as particulars belong to *generalogism*, or induction, *syllogism* lies between the other two modes in equal dependance upon them; accordingly, the validity of the foregoing syllogism depends upon an ultimate analogism, proving the major — that all men are fallible;* and an induction, proving the minor — that philosophers are men; and if such basis is wanted to either, the conclusion falls of course.

461. The propositions of which the syllogism is composed partake of the same relations, depending equally upon induction, or experience, and analogism, or reason; but Aristotle, regarding syllogism and induction as opposites in ratiocination, overlooked the analogism as the extreme opposed to induction, and syllogism as their mean. See his "Prior Analytics."

462. Now, there are three degrees of conviction, or mental satisfaction, through, 1. *possibility*, 2. *probability*, and, 3. *necessity, or certainty;* the

* Men are fallible, inasmuch as they are capable of proceeding contrarily to the true *reasons or relations* of things; they would otherwise be *infallible*. The predicate fallibility belongs, therefore, to the universal predicament or category *relation*, which is proved by *analogism*.

first and last of which are extremes without remission; and the second is their mean, of which the degrees are indefinite. A thing is possible, or it is nothing; and that which we call necessary is irrefragably so, or it is null.

463. The Syllogism, then, as a mode of ratiocination depending on premises which require proof, appears, even when most perfect, to fall short of necessity or certainty, while it proves, in general, beyond mere possibility; its evidence lies, therefore, in the various degrees of probability between the extremes of possibility and certainty.

SECTION II.

464. We have here traced the Syllogism in a subjective, or logical view, to the first category, RELATION; and Digby has performed the same with so much perspicuity in an objective, or philosophical view, from the correlative category, EXISTENCE, or being, that we will subjoin an abstract of his doctrine.*

465. The notion of *Being, or Existence,* is of all the most universal, the simplest, and most deeply rooted in man; whence it is evident that the conjunction of signification, or *terms,* or union of apprehension by the means of being, is, in truth, an identification of them: for unity, being a nega-

* Treat. "Body and Soul." Paris Ed. fol. p. 366.

tion of multiplicity, it follows that what is one is the same; and this identification is truly and naturally expressed, by saying that the one is the other.*

466. The most complete knowledge we can have of any thing, is of such *propositions* as in the schools are called identical; as if one should say, John is John, or, a man is a man. In these we may observe, that evidence of truth arises out of the plain identification of the extremes that are affirmed of each other.

467. Now, affirmative propositions do, by their form, import an identification of their extremes (for they all agree in saying the one is the other, or this is that); yet they are not all alike in the evidence of their identification, for in some it shews itself plainly, without needing help, as in all truisms, and such identical sayings we just now gave for examples; others require a course, or discourse, somewhat further about to prove the identification of their extremes.

468. Now, the scope of such *Discourse*, or Argument, is to compare such propositions to some third thing with which each of them apart is identified; since those which agree with the same thing must also agree with each other.

469. When identity between two or more things presents itself to our understanding, it

* Sydenham's "Plato." Banquet. p. 212, N. 186.

produces knowledge (or acknowledgment) in the mind; whence it is manifest that the same power, or mind, which in a single apprehension, or term, is possessed with the entity, or unity of it, is that very power, or mind, which, applied to an enunciation or proposition, knows, acknowledges, deems, or understands; since knowing is nothing else but the recognising or apprehending of manifest identity in the extremes of a proposition.

470. The natural perfection of the mind or understanding is to be fraught with the whole universe; that is, to have the knowledge of all things that are (agreeably to the Platonic dogma, that the mind knows all things virtually). Truth residing only in the assents and judgments of the mind, wherewith it enriches itself with the rest of the world; and these being framed by the discovering of an identity between two things, which is expressed by affirming one of them of the other; it follows, that nothing can be true or false but where there is a composition of two extremes, made by one's being affirmed of the other; which is done only in enunciations or judgments, while single apprehensions assert nothing, and therefore settle no knowledge or relation in the mind.

471. Having shewn how two apprehensions*

* The *copula, or apprehension of union and relation,* is not enumerated here, because it is alike in all propositions. The three terms, or apprehensions, are nevertheless essential members of every proposition or judgment.

joined together make a judgment, the next thing will be to shew how three of those thoughts or judgments, well chosen and duly ordered, compose the most simple of perfect arguments, which logicians call a *Syllogism;* whose end and effect is to gain the knowledge of something before hidden and unknown.

472. The means whereby this is accomplished is as follows: by the two first judgments we join the extremes of the proposition we desire to know to some third thing, and then, by observing that they are both one third thing, and that one can be but one, we come to discover that truly one of them is the other; so that the identity which first made an identical proposition to be known and acknowledged, and afterwards caused the like assent to those propositions whose identification was immediately apparent, now, by a short circuit, and bringing in of a third term, or medium, makes the two first — the identification of which was obscure and hidden while we looked upon the terms themselves — appear to be truly but one thing or relation.

473. The variously combining and disposing of these three terms in the two first propositions beget a variety in the syllogisms that are composed of them, which consists in this — that the assumed third term, to which the other two are interchangeably joined, is either said of them, or they are said

of it; or it is said of one of them, and the other is said of it.

474. Neither is there any deeper mystery than this in the *three figures* so much talked of by logicians, which being brought into rules to help the memory in the ready use of this transposition of terms, if we spin our thoughts thereon into ever so fine threads, and thereof weave too intricate webs, without reflecting on the solid ground and relations within ourselves whereon these rules are built, we may spend our time in trivial and useless subtilities, and at length confound and misapply our natural reason with a multitude of precepts drawn from artificial logic.

475. Under this primary threefold variety is another of greater extent, growing out of the various combinations of the three terms, as they are qualified by *affirmation* or *negation*, and by *universality* or *particularity;* for that unity which the two terms, whose identification is inquired after, must have by being joined with the third, becomes much varied by such applications.

476. And from thence arises that multitude of kinds of syllogisms which logicians call *modes;* all of which we have thus particularly expressed, that we may observe how this great variety depends upon the sole principle of *identity and entity;* or, to express the same thing in other words, upon *universal relation and existence;* for all logic de-

pends, as we have shewn, subjectively upon the prime category *relation*, and objectively upon that of *existence*.

SECTION III.

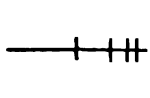
477. As ANALOGISM is the form of ratiocination principally applicable to the intellectual sciences and universals; as the *generalogism* is, in like manner, to the material sciences and particulars; so is *syllogism* the form principally applicable to the Mathematics and the sensible sciences, and partakes of their intermediate relation. The first of these forms belongs to the category of *relation*; the second, to that of *quality*; and the last, to that of *quantity*: and since quantity and quality are relations, analogism comprehends syllogism and generalogism fundamentally.

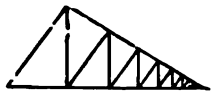
478. Syllogism is not, however, the sole mode or form of quantitative and mathematical reasoning, but only its principal organ, since we find examples of the other modes therein; accordingly, the first principles of all the pure mathematical sciences are proved analogically, as are also harmonics and proportionals. Generalogism is also of frequent occurrence in mathematical questions, or the two latter modes may be compounded.

479. Thus we may demonstrate, either analogically or by induction, that all triangles and all equiangular and rightlined figures, whether lineal, surfacial, or solid, are composed of, and resoluble

into, like figures to infinity, as exemplified in the bisected line, triangle, parallelogram, &c.

Fig. 9. *Fig.* 10. *Fig.* 11.





Nor do we need any example to prove that the syllogism does not belong exclusively to the mathematics, but extends to all intellectual and material subjects; in which respect it coincides with the other modes.

480. Some, indeed, found Logic altogether upon the mathematics, and call it the science of ratio, &c.; but in truth the mathematical disciplines draw their accuracy, and are deducible rather from ratio, or reason, and an accurate logic, applied to the homogeneous relations of *quantity*.

481. The mathematician *defines* his terms — establishes universal axioms and postulates (which are the *categories* of the mathematician) — constructs theorems and problems, or theoretical and practical *propositions*—and finally *demonstrates syllogistically*; all of which is exactly according to the scholastic or Aristotelian logic.

482. The clear light and truth of mathematical reasoning depends upon the homogeneity of its matter, and the correctness of its premises; and other sciences are capable of the same precision, in proportion as they are divested of the *hetero-*

geneous; while the mathematics themselves lose their cogency when applied to subjects unconnected with, or remote from, the category of *Quantity*, to which they belong.

483. The want of perspicuity in subjects of argument, is extremely increased by the equivocalness of words or terms, whereby they are taken in different senses in the various members of a ratiocination; so that there arises a real discordance with a seeming agreement between the premises and the conclusion, of which men either take advantage designedly, or are thereby betrayed into *sophisms.*

484. It has been shewn that the Syllogism is a mode and process intermediate to, and dependant on, Analogism and Generalogism as extremes; and that the Analogism is the mode of intellectual and *ethical* science, as the Generalogism, or induction, is of material and *physical* science, to which the sensible or esthetical science is intermediate; it may, therefore, be asked, if syllogism is the mode of esthetical science?

485. We reply, that as induction or generalogism supplies the evidence and demonstration of physical and material things, and analogism does the same of ethical and intellectual things, according to our analogy; the evidence and demonstration of esthetical things are *sensible*, and that in matters peculiar to sense, sensation must ultimately determine.

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CHAPTER VI.

GENERALOGISM.

SECTION I.

487. LAST of the three modes, or forms of ratiocination, is the GENERALOGISM or INDUCTION, or the logic of instances and individuals; and it argues synthetically from the *particular*, or partial relations, to the *genera*, or general relations of things: it is, therefore, the extreme mode of logical science opposed to the *analogism*, which argues analytically from *universal*, entire, or perfect relations, to species, or *particular* relations. We have just before shewn that the *syllogism* lies between them, as a middle mode.

488. The *simple* generalogism argues from a single instance, or individual, to a particular, a general, or a universal. For example:

Instance . . . *Cromwell's* usurpation succeeded.

Particular	Inferences	*Napoleon's* usurpation will succeed.
General		*Other* usurpations will succeed.
Universal		*All* usurpations will succeed.

489. Arguing from a particular is precisely the weakest of all legitimate arguments, not at all allowable in the other modes, but very common in colloquial practice, though rather rhetorical than logical, since its evidence does not amount to probability, but demonstrates possibility only. It is strengthened in proportion as we increase or add to the number of its analogous instances or examples, as it is, also, by extending its relations; and it then becomes a *compound* generalogism, or aggregate induction, the strength of which lies, also, in the extent and number of its related instances.

490. As the world, viewed by reason or active intellect, is a universe, or whole, and its parts are unities, or lesser wholes, so, when viewed sensibly, or by passive intellect, things consist and exist in infinite variety; at the same time, active and passive intellect, or reason and experience, concur in *reducing this variety to unity,* or order, on the one hand, and, on the other, in *deducing generals, or unities, from the varieties of particulars;* and this is the twofold office of the generalogism.

491. There are, then, two species of the generalogism, the materials of both which are particulars: by the first we *class, or arrange particulars under a general term, and generals under the more general and universal;* and, by the latter, we *gather that which is general among a variety of particulars, and ultimately that which is universal from generals.*

492. The first is properly an *induction*, and determines the rank, or class of particulars with regard to each other and to *universal being;* and the latter a *deduction*, and determines the most general or *universal relation*, predicate, attribute, or form of a class of particulars: the one terminates in the category of *Existence*, the other in that of *Relation*, under which all knowledge is comprehended.

493. We may, therefore, distinguish the generalogism categorically into the *Material Generalogism*, or induction of the matter, or logical subject; and the *Formal Generalogism*, or deduction of the form, or predicate.

SECTION II.

494. By the MATERIAL GENERALOGISM, or generalogism of the subject, we collect particulars or individuals; as, for example, Charles, Edward, Frederick, William, Mary, Georgina, Catharina, &c., and unite or class them under the general term, *Man;* and again, we collect the general terms Man, Horse, Dog, &c., and connect them under the more general term or genus ANIMAL; again, we collect the higher genera, Animal, Vegetal, Mineral, under the most general term, MATTER; finally, we collect the superior genera, Matter, Sense, and Intelligence, under the superlative, categorical, or universal term, EXISTENCE.

495. Thus we induce, or determine, the rank or class of the subject, particulars, or individuals, Charles, &c., with respect to universal existence, by arranging them under the general natures or terms Human, Animal, Material; and this we call an induction of the matter, or subject: and though, by a series of generalogisms, we thus connect the extremes of universal and particular, the intermedia are infinite. Thus, between the terms Charles, &c., and Man, lie European, Asiatic, &c.; and again, between Animal and Material lie the terms Terrestrial, Aquatic, Atmospheric, Planetary, Solar, Sideral, &c., and so on intermediately without end.

SECTION III.

496. Again, by the *Formal Generalogism*, or generalogism of the form or predicate (upon which the great Verulam founded his "Novum Organum"*), we investigate, for example, the par-

* The Inductive process was not exclusively the discovery of Lord Bacon; his ancestor, Friar Bacon, is even supposed to have laid the foundation of his attempt in his "Opus Majus" (see "Hallam's Hist. of the Mid. Ages"). Socrates, however, according to his disciple Plato, whose "Dialogues" afford still the best examples of the generalogical process, appears to have been the first and greatest master of this mode; nor was it unknown or unnoticed by Aristotle, &c. To Lord Bacon, however, was reserved that application of induction which has been found so efficient in the physical sciences, and of such practical advantages in the utilities of life, that the epocha of philosophy,

ticulars, Charles, Edward, Frederick, &c., and find in each a *material structure;* but this includes also Animals, Vegetals, &c.: we discover in each, *Sensation* also; but this yet includes all other animals: and, finally, we find, upon further investigation, in every man *Reason;* and this, excluding all other things, is his peculiar attribute, characteristic, or most general predicate, or *Form,* under the universal term, or category, RELATION.

497. Such, briefly, is the formal Generalogism, or *deduction of the form or predicate;* wherein, also, the intermediate stations or distinctions are innumerable between the extremes of the lowest material and the highest rational, or relational nature of man. By these species of Generalogism we *abstract* the general or common nature of particulars, as by the foregoing we *aggregate* or congregate particulars by the general natures in which they agree; by both we *generalize, or generalogize.*

as modern, will be assigned to his time by historians. Bacon seems to have been led into this mode as much by his judicial habits, in which induction, including the logic of evidence and circumstances, is indispensable, as he was by the bent of his genius; and although it is acknowledged he left his great work unfinished, we are not aware of any direct attempt to improve the logic of generalogism since his time. The Abbé Jurain has, however, treated of this branch of logic with art and method, well worthy of attention, in his "La Logique dégagé de la Dialectique," sect. i. c. ii.; and Dr. Shaw, in his edition of the "Novum Organum," has thrown out some valuable hints for its improvement.

498. So much with respect to the Generalogism by way of outline. As, however, this mode has been little advanced by logicians since the time of Bacon, who confessedly delivered it imperfectly, we will endeavour, for the sake of research, to retrace it in another view.

SECTION IV.

499. The world around us consists, then, we repeat, of a universal variety of particulars and generals; and this variety, philosophically viewed, is either *Essences or Relations;* or, logically and philologically, it is a variety of *subjects or predicates;* or, physiologically or physically, of *substances and qualities,* or properties, &c.: and of these the signification is the same under different views.

500. We have already considered the Generalogism in a logical view; but as this mode is principally applicable to *physics,* we will also regard it physically.

501. As the term particular, or individual, physically and logically, like its correlations general and universal, signifies a unity, it must be *a unity of parts,* or an integer; there is, therefore, nothing in the universe absolutely particular or singular, and accordingly *every particular sensible thing, or subject, consists of an assemblage of qualities,* or attributes; and *every quality exists variously in a*

variety of subjects or things; and this accords equally with reason and experience.

502. The particulars, or premises of a generalogism may, therefore, be collected *analytically* as well as *synthetically*, and it follows from the above that, by the analytical process, we either seek all the attributes or qualities of a subject or substance (as, for example, of Gold), or we seek all the subjects or substances of a quality or attribute (as, for example, of Heat), and from these we deduce the general nature of a subject or substance, or of an attribute or quality; the first of which may be called a *generalogism of the matter*, the other a *generalogism of the form*; and thus the generalogism takes the same distinctions physically as logically. Of the synthetical process we have already given brief examples.

503. As the particulars of the world may be regarded first as essences, subjects, or substances, &c., or, secondly, as relations, predicates, or qualities, &c., according to the category under which they are viewed, the distinctions of subject and predicate are reciprocally convertible or interchangeable, both with respect to the syllogism and generalogism; we may, therefore, generalogize of things either as subjects or predicates, analytically or synthetically: as, for example, of *Heat*.

504. The terms particular, general, and universal, being relatives, and there being no *particular* that partakes not of a general or manifold nature,

neither is there any *general* that may not be regarded as particular. Hence, any general or aggregate may, by the analytical process just mentioned, become the matter, or premiss, of a generalogism. The same also holds with respect to *universals;* the generalogism is, therefore, a universal and infinite process.

505. As the synthetical process ascends to the genus, or to that in which particulars unite or agree, so the analytical process descends to the subordinate agreements and specific differences of particulars. Thus the variety of particulars, John, Thomas, Henry, &c.; Lion, Horse, Dog, &c.; Elm, Yew, Rose, &c.; Nitre, Iron, Clay, &c., agreeing under the term *material substance,* differ under those of *Animal, Vegetal, and Mineral.* Again, of the particulars, John, Thomas, &c., Horse, &c., agreeing under the term *Animal,* differ under Human, Quadruped, &c.; and again, the particulars, John, Thomas, &c., agreeing under the term *Human,* differ under those of *Brown, Fair,* &c., which latter are distinguishing differences of the Individuals, &c.

506. The differences of the individual are the variety of which it is constituted, and being unfolded by analysis, become the matter of the generalogism before-mentioned.

507. In every species or form of the generalogism—and it is that which distinguishes it from the other logical modes—there is, first, *a collection*

of various particulars, by synthesis or analysis; and, secondly, *a disclosure of a generality*, or agreement among them. To generalogize is, therefore, to generalize; and this may be done affirmatively or negatively, by collecting or rejecting of instances and particulars, till the general, or universal term or proposition, is confirmed.

508. In fact, the induction rests upon the analogy of nature, by which we recognise its uniformity and constancy, and conclude from causes to effects; inferring from similarity or analogy of causes, to similarity or analogy of effect, &c.: so that, in strictness, the analogical process is at the foundation of all logic.

SECTION V.

509. When, by analysis of a general or universal, the *Generalogism* seeks the agreements and differences of things, it verges upon the *Analogism;* so, in particularising, we have remarked that the latter mode verged upon the former synthetically; at the same time, these two processes concur in the *Syllogism* antithetically: these three modes, therefore, reciprocate, and are also convertible.

510. It is an essential distinction of the three forms of argument that the Analogism concludes *immediately;* the Syllogism, *mediately*, or through a middle term; and the Generalogism, through *many media*, or particulars, to universality.

511. It is a further distinction of these forms that the categorical, or perfect Analogism, concludes and proves *the whole amount of its premises;* the Syllogism, *less than the amount of its premises;* while the conclusion of the Generalogism comprehends *more than its premises:* whence the fallacies of this latter mode.

512. The logical axiom — that *no more can be strictly inferred or concluded from any argument than is contained or included in its premises* — holds good not only in the Analogism and Syllogism, but also in the Generalogism. *Without universal in the premises, therefore,* there can be no *universal or perfect conclusion;* but this is generally impossible in the Generalogism, because particulars which constitute its matter, or premises, are infinite throughout nature.

513. In any case, however, in which all its particulars can be enumerated, a perfect inductive argument may be constructed; as, for example, in numbers, agreeably to the axiom that *the whole is equal to all its parts.*

514. The force and extent of evidence in the Generalogism is, consequently, proportionate to the number of parts, particulars, or media, it comprehends or contains; and, if this fall short of universality or totality, its evidence (however sufficient it may be in general to satisfy inquiry) amounts only to some high probability, and not to certainty, perfect cogency, or necessity.

515. It holds equally true, in each of the three modes, or forms of logic, that *there can be no conclusion out of the category of an argument;* that is, no arguing conclusively from one universal genus to another. In the strict logical investigation of any subject, it is then of chief importance to keep in mind that *the premises and conclusion must be reciprocally homogeneous.*

516. Therefore, Essence and Relation being the sole categories, and the EXTERNAL, MEDIAL, and INTERNAL, the universal genera of knowledge having each its appropriate evidence, we cannot conclude logically from one to the other; and as the evidence of the first of these three genera is *matter of fact* (such as are the testimony of witness, experience, and history), while the evidence of the second of these genera is *sensations,* and that of the third is the pure and *perfect relations of reason,* we cannot conclude from the relative to the absolute, nor the contrary; nor from reasons to facts, nor the contrary; nor from either of these to sensations; nor, *vice versâ,* from either. As, however, there is no absolute separation of the three genera, each may be used in aid, or illustration, of the others, although it will afford strict logical conclusions on its own ground alone.

517. Conviction through truth is the great end of logic; and it is apparent that this, in *matters of doctrine and science,* can alone be adequately obtained through pure intelligence and reason, or

relation, — that, in *matters of taste, sense, and discipline,* truth and conviction are dependent upon sense, — that, in *matters of fact and art,* they depend upon external testimony and experience, or experiment; and that, finally, in complex matters, truth and conviction must be sought through a compound testimony with all possible attention to homogeneity and genuine analogy.

518. We see, hence, why, in common phrase, "*Facts are stubborn things*" — why "*Tastes are not to be disputed*" — which may be asserted of all feelings and affections also; and why *the conclusions of genuine reason are not to be resisted.*

519. Were it otherwise, conviction might be obtained through physical force, which is the logic of Power, — the right of might, — and adapted to the irrational only, and to be employed only in those offices of authority in which reasoning would be either misplaced or absurd; as in the disciplining of Children, the executing of Laws, or the commanding of Armies, which, although they require to be founded on reason, dispense with argument, and give orders only, in practice. Between these several cases there are, however, many media. So much with regard to Dialectics, and respecting the forms or operations of Logic.

CHAPTER VII.

METHOD.

520. THERE remain for notice, according to the custom of logicians, somewhat concerning METHOD, as a mean for the discovery and promulgation of truth and science, and somewhat concerning the *Sophistical Arts*, by which logical truth is corrupted and perverted.

521. And here, since our object is not an insulated and practical treatise on Logic, we may briefly remark that Method signifies regulation according to relation, and that our whole system aims at supplying the best possible method, namely, that of nature, in which every subject may be considered and treated with reference to all other knowledge in the same universal way — open till we have entirely examined and exhausted it, by first tracing and considering it in its nearest and most prominent, and ultimately in its remotest relations, *Analytically* and *Synthetically*, or *Antithetically*, according to the subject.

522. And this has brought us to the two di-

visions usually assigned by logicians to Method; namely, *the method of solution* and distribution, called analytical; and *the method of composition* and aggregation, called synthetical; between and connecting which lies an antithetical method, or *method of comparison or analogy*, by which we systematize, put in order, and harmonize any subject.

523. Some obscurity of signification has, however, attended the two former distinctions; analytical and synthetical *à priori*, being the contrary or opposite of analytical and synthetical *à posteriori*. So, again, physically analytical is the converse of morally or intellectually analytical. The sense, however, in which we have employed these terms is that of the intellectual, or *à priori*.

524. Of these *Methods, the analytical* is the true doctrinal method applicable to science and philosophy, of which the present work may be regarded as an example. *The Synthetical method* is disciplinal, and applicable to the Disciplines; as, 1st, to that of Philology, which, beginning with letters, proceeds to words and propositions; 2dly, to Logic, which, beginning with words or terms, proceeds to propositions and argument; and, 3dly, to the Mathematics, which, beginning with terms and definitions, proceeds upon axioms and postulates to propositions and demonstrations. *The Antithetical method* is technical, at once theoretical and practical, and applicable to all the Arts: the three methods are nevertheless effi-

cient in each respect; and hence they have been variously applied and confounded therein.

525. Accordingly, the first care in teaching an art is to make the disciple acquainted with its materials and instruments, and with their right use or *Discipline;* the next thing is to instruct him in its theory, regulative relations, and *Science;* the last is to initiate him in producing their goods or ends practically, and with *Art* or skill, according to true natural and logical method; and, in accordance with the series of Causes (for art is cause), as enumerated by Aristotle, the material, the formal, and the final, which coalesce in the efficient or producing cause of every art.

526. The above method goes to the whole of every subject, and even distributes itself among each of its distinctions, as discipline, science, or art; for ours is a system of co-relation throughout, and affects not, but rejects, the absolute.

CHAPTER VIII.

SOPHISTRY.

527. ALTHOUGH the end of Logic is the attainment of truth, it has a negative purpose in the detection and reproof of error; and as the rules of Logic are sometimes perverted for the sinister purpose of deceiving, and there is also a misapplication of its organs which terminates in undesigned error, some examination of the grounds of SOPHISTRY may be justly deemed an essential appendage of logical discipline; and as such it has been regarded by the principal masters of Logic.

528. *Sophistry*, then, as a subject, traverses the whole logical universe. It is not incumbent on us, however, to develope all its ramifications, since it will suffice to disclose the most general and practised forms in which it embraces the chief organs of logic; as base art, or as ignorant inadvertence, the grounds of error, confusion, and controversy.

529. And these consist, first, in either *the substitution of terms,* or of thoughts, or of things, or of either of these for the others; through which the premises and conclusion in each of the logical forms become vitiated.

530. Another source of Sophistry is the *innovation upon the premises,* by the *bringing in of new matter,* or the *leaving out of something essential,* in all of which there is a *shifting of the position,* or proposition; and accordingly, the practisers of *evasion* in any way are in vulgar language called *shifty.*

531. And although, in arguing on new ground, it may be sometimes expedient, or even necessary, to change the position, to rectify the premises, it is requisite, at the same time, to recommence or review the argument; but these are more frequently artifices contrived to elude or confute an antagonist, than either for fair argument, or from inadvertence and self-deception, through false zeal or want of knowledge and skill: nevertheless, if there were not such craft on the one hand, and such inadvertence and credulity on the other, this discipline might decay for want of exercise.

532. There is a third mode of Sophistry, which consists in the *adapting of the premises to the conclusion,* as in the bold assertion of false premises, and thence arguing fairly to a false conclusion. In

this there is a *petitio principii*, or begging of the question, and arguing in a circle, which is not always used with design, but often with great simplicity and sincerity.

533. As all confutation of argument ends in reducing it to absurdity, and as absurdity is ridiculous, there is established thereon a mode of Sophistry, the ground of which is, that as ridicule is founded on absurdity, so may the absurdity of any question be established by *ridicule*. But this argument itself is absurd, and ridicule is essentially ridiculous in logic, having no pretension to reason, and being founded altogether on the sensual regard for laughter; and, if it be at all logical, it is the medium between reason and force, hardly a lawful remove from the logic of the fist, and preferable only as less violent, and little less degrading.

534. *Ridicule*, which throws the mind off its balance, as laughter does the body, is, in an argument, principally allowable against itself; it being fair, in all contentions, to turn the delusive and unlawful weapons of assailants against themselves, whether they be instruments of ridicule, scurrility, irony, or iron; and although "truth may bear all lights," as Lord Shaftesbury has asserted, yet will it take the colour of the light thrown upon it; and ridicule may cast upon truth a gleam of the ridiculous, al-

though it cannot penetrate to destroy it. And although, like the diamond, truth is not injured by casting dirt upon it, it may nevertheless be thereby soiled and obscured. The use of such weapons in serious and honourable contest is therefore the mark of a degraded and undisciplined mind, indigent of lawful instruments, and unskilled in exercise.

535. Nevertheless, there is an appropriate use of ridicule, in reproof of the palpable follies of mankind; nor can there be any just objection against the limited use of mock argument, which negates itself, for the purpose of wholesome satire, in correcting of those vices and errors which neither reason nor lawful authority are allowed to reach.

536. When strong prejudice falls upon argument, reason and ridicule are equally unavailing; and as in all false argument there is some prejudice, the fairest, least offensive, and perhaps the most efficacious mode of *confutation*, is to grant the false positions and premises of the disputant, and to urge them to extremes, which never fail to terminate in absurdity: more vehement attacks are thus eluded, and the antagonist falls by his own weight and impetus. There is also sometimes a cutting and powerful reproof of this kind in *silence*.

537. These exemplify the *argumentum ad ho-*

minem, which turns a man's weapons harmless upon himself — when the *argumentum ad judicium* is rendered useless by prejudice, on the one hand, and the *argumentum baculinum*, or knock-down argument, might be as dangerous as it is totally illegal, on the other: and these are the three celebrated and sole simple forms of natural disputation, as sensible, intellectual, and physical, from which other heads are deduced or compounded.

538. As to controversial and contentious arguments, there can be no such things when words and terms are rightly understood, the premises truly laid, and the consequents justly deduced. To these objects, dissidents should direct their attention; for truth and justice cannot fail to agree but through want of knowledge or understanding, or of sincerity and honesty in the litigants.

539. And as to scholastic wrangling and debate, in particular, they are mere logodædaly, or a war of words; which, though affecting to employ reason, puts the winning of the game or victory in the place of truth, and is altogether sensual, unknown to true philosophy, unworthy of the logician, and may be properly consigned, with all the logic of sophistry, factious clamour, and special pleading, to the abusers of reason at the hustings, the rostrum, and the bar.

540. And, finally, as to him who mistakes either laugh, smile, sneer, sarcasm, satire, scorn, pun, irony, contempt, rallying, ridicule, epithet, declamation, or eulogy, rank, riches, or authority, assumption, invective, interrogation, or command — either or any of these, or similar sensual forces, for argument or confutation — he is but a sorry and contemptible logician; while he who disingenuously resists truth and just argument is not merely a bad logician, but is dangerous, and not to be trusted.

541. As *confounding of the question* by legal epichirema, long discourse, or otherwise designedly, is one of the endless subterfuges of sophistry; it should be kept in mind in all sincere argument, whatever be the mode employed, that there is a unity of truth and reason which is best promoted by simplicity: hence, there is in every case a best argument; and whatever is urged beyond it does in general but embarrass and enfeeble the question, often leaving that obscure in the end which was clear at the commencement.

542. We have already enlarged, unnecessarily perhaps, upon the accidents of logic; and to treat of the *resolution of sophisms*, the many arts of proof and confutation, and the variety of topics, is altogether needless to our design, they being also amply discussed in many principal works of the Logicians. So much only, therefore, with

regard to Nouology, and the whole of the Logical disciplines, as precedent to, and at the root of, *the Mathematical Disciplines*, to which we proceed.

OUTLINE IV.

MATHESIS:

OR,

THE ANALOGY OF THE MATHEMATICS

INDICATED.

MATHESIS:

OR, THE

ANALOGY OF THE MATHEMATICS.

INTRODUCTION.

543. THE present Outline would, if we had followed the systematic order of our primary analysis, have been confined to the branch of Ontology, or the science of elementary powers, physical, sensible, and moral; having, however, marked the genus in our first outline, in the view of science, it is our intention, in the present, to treat only of the *Mathematical* species, or principal branch of Ontology, as *Disciplines* essentially connected with the universal series of Science and Philosophy.

544. Regarding, therefore, the *Mathematics* (which are the only fruitful branch of the philosophy of natural principles, or Ontology), as *disciplinary*, according to the etymology of the

word; and, considering them more as *instruments* than as sciences, we have distinguished them as such, apart from the central series of the Mesological sciences.

545. In the natural order of universal science and philosophy, doctrine precedes discipline, and discipline precedes practice. In the artificial order, however, in which the sciences are delivered synthetically, detached, and, in an upward course, *Disciplines* precede the *Sciences*, and the *Arts* follow these in course.

546. To the first of these the Mathematics belong — not that they alone are to be regarded as disciplines, but only as *the chief disciplines*; for every doctrine or science has its discipline, and so has every art: Sciences, Disciplines, and Arts, are therefore correlative. But some subjects are more purely scientific, some more immediately technical, and others more particularly disciplinary; and among the latter we regard the Mathematics as pre-eminent.

547. Regarding the sciences, according to universal relation, as of internal, and the arts as of external reference, disciplines will stand in reference to them both as medial, and it coincides herewith that of the sciences the medial are also the most analogous to the Mathematics; and such, for instance, are the philological sciences, and whatever regards language and sense: and so prone have the learned been to assign pre-

eminence to disciplines, that the Philological sciences and the Mathematics have, together with Logic, nearly usurped the whole ground of learning.

548. In strictness, therefore, the analogy of Disciplines comprehends *Logic*, *Philology*, and the *Mathematics*; we have accordingly conjoined them, as a basis for the succeeding series of Sciences and Arts. These three great branches of knowledge, as Disciplines, are, as we have seen, the proper subject of Education in its principal acceptation, and should hence, also, in strictness of method, precede the sciences, which are its objects, and the arts, which are its end, since these disciplines are, in one shape or another, the necessary foundation of the sciences and arts.

549. In representing the Mathematics as instruments of science, rather than as sciences, we may anticipate objection from some Mathematicians, who regard this branch of knowledge as pre-eminently, if not solely, scientific; and mathematical disciplines have been so infused into the plans of the sciences, and so incorporated therewith, that the distinguishing them from science becomes necessary to a clear comprehension of the relations of knowledge; and the restraining of these auxiliaries of science, in a regulative view, to their important disciplinary and instrumental functions, becomes a duty of the philosopher.

550. We dispute not, however, about a mere

term, for, as such, *Science* has been employed to denote all sorts of skill and knowledge; and we have been obliged, rather by necessity than choice, to limit the term science to theory, as distinguished from practice, or *art*, and from *disciplines*, which are initiations to thought and practice, and to assign the latter term to the mathematics, according to antient usage.

551. Such limitation disparages not, nor detracts from, the just scope and value of the mathematics. On the contrary, it assigns to them the station whereon they stand in equal relation, and partake equally the honours of the infinite field of science and art properly so called; and it was on this account, perhaps, that the Pythagorean philosophers honoured Disciplines far above all Sciences and Arts.

552. So far, therefore, are we from degrading, that we restore their antient philosophic rank to the mathematics, the field of which is infinite, and contains within itself, also, auxiliaries of a yet more instrumental or disciplinary, and less truly scientific character; such as are Algebra, Logarithms, Fluxions, the integral and differential Calculus, Vulgar Arithmetic, and a hundred other eminent inventions — the instruments of instruments in science, which are of great power in facilitating and extending mathematical operations.

553. It is highly necessary, nevertheless, in a regulative point of view, for the advancement of

science, that its ground should be cleared from adventitious arts and disciplines, for which their inventors and votaries assume the chief powers and places, and thereby confound the true relations of science, give to forms and formulæ the place, and to mere artifices the name and reputation, of science and philosophy.

554. If this were allowable to the mathematical disciplines, with equal reason might alphabetical writing, Stenography, Printing, and other Philological arts, which, too, have their sciences, and are eminently instrumental throughout all science, assume to be science itself, or the chief science; or even a display of mechanical instruments might be substituted for science or art, and quackery supply the place of skill and knowledge.

555. Not only in the æsthetical and ethical sciences have the Mathematics had false influence; they have also corrupted philosophy, by postulating lines, figures, and imaginary atoms, for entities and real elements of things. But, in truth, the Mathematics have no validity out of the category, nor beyond the relations of quantity; they are, therefore, principally applicable in the mechanical part of physical sciences; and even herein their results are dubious, when they attempt to demonstrate by assuming qualities to be quantities.

556. Not, indeed, but that quantity is of universal analogy and reference; but it leads into

error when things material and physical are regarded as figures, forms, and ratios only; and still more so, when things sensible and moral are regarded through these disciplines as material and mechanical: courses which, instead of rendering matter intelligible, or of elevating man through intellect to God, inclines him, through a false materialism and mechanism, to atheism and immorality.

557. The apparent strictness of the Mathematics, and the cogency of their logic, together with the confidence of their language, have obtained for whatever is treated in the mathematical method a consideration as if certainty accompanied its arrangements and conclusions; nevertheless, what have been the results of this method in morals and metaphysics — from the mathematical demonstrations of the elements of matter, to the like demonstrations of a God? The mathematical method itself is subordinate to a correct logic, and of no force but in virtue thereof; and Physics and Metaphysics owe neither their matter nor their just manner to the Mathematics, however falsely they may have been estimated in those sciences.

558. The Mathematics, then, are an accurate logical discipline, and, when employed upon homogeneous data, evince, in an admirable manner, the certainty of correct thought; hence, they exercise the mind in a pure discipline, and thereby qua-

lify it for the highest attainments of intelligence, chiefly by exercising the powers of memory and attention, by curbing imagination, and by employing reason upon solid ground both analytically and synthetically; in all of which their disciplinary power is manifest. But when they transcend their category, and waste the powers of mind in resultless speculations, they make the instrument the end, abstract thought from useful knowledge, and overlay the mind with unfruitful learning.

559. The Mathematics have fared, like many other subjects, in obtaining rank and consideration from their utility and practical importance; by also astounding the ignorant with an ostentation of learning, and the mysterious display of figures and symbols which accompany their details; and by aweing the learned with overweening pretensions to imperative certainty. Yet are the Mathematics not only as fallacious as any of the sciences when they do not build upon perfect data, but they are even more so: for if they fail ever so little in their premises, or quit their category, they go on to multiply error unboundedly, and magnify fallacy to enormity; and this is true arithmetically, geometrically, and mechanically, while the errors of other sciences have comparatively little either of intension or remission.

560. We urge all this, not to the prejudice of these Disciplines, but contend only for their true rank and relation in the system of knowledge;

while, for their logical accuracy, when properly posited, we glory in and regard them as the triumph of reason, and refuge against scepticism in the abstract; but lament that in the mathematics, as in morals, men have idolized the instruments, forgetful of their offices and ends.

561. And, although in themselves, and unapplied, the Mathematics are merely speculative, yet are they instrumental in fertilizing many sciences, on which account they merit the highest regard of the philosopher; while they are no less important theoretically, and of greater practical utility, in the arts and common affairs of mankind.

562. Bacon taught Philosophers the right method of philosophizing in Physics, by experimental examination of the things themselves, and induction therefrom; and the illustrious Newton adopted and followed this method in his Optics, in conjunction with a mathematical process, in which he chiefly confided, and to which we owe his sublime discoveries in Astronomy, and some mistakes in other sciences.

563. In Astronomy, however, the whole of the mathematics, comprehending the sciences of Number, Figure, and Motion, are principal and indispensable; but, in material and elemental Physics, these sciences are of illustrative use only, and demonstrate nothing. Nevertheless, seduced by the success, fame, and authority of Bacon and Newton, succeeding inquirers have forced the Mathematics

and induction irrelevantly into all the sciences, material, sensible, and moral.

564. Reasoning from one genus, or category, to another, is necessarily fallacious; because, although there must be some general and remote analogy between them, whereby they are connected, their relations are distinct. The only use that ought to be made of such reasoning is to illustrate and assist conception. All the error of the antient, and much of that of modern physics, lies in mathematizing upon conjectural data, — assuming elements to be atoms and to have number, figure, and motion, interchangeably; but elements are not motions, &c., but powers producing motions, &c.

565. Thus the chief antient philosophers erroneously assumed that physical are derived from mathematical entities, and that the elements are *solids*, attributing to them triple powers: to fire, or the active element, tenuity of parts or *number*, acuteness or *figure*, and facility of *motion*; to the passive element, or earth, grossness of parts or number, obtuseness of figure, and difficulty of motion; to air, tenuity, obtuseness, and facility of motion; and to water, grossness, obtuseness, and difficulty of motion, according to mathematical relations throughout, and a very remote analogy.

566. Of whatever practical importance the Mathematics may be in the mechanic arts, and however indispensable they may be to the mixed

sciences,—such as Astronomy, Navigation, Optics, and all the Physico-mathematical sciences,—they are inapplicable, or merely illustrative, in the Moral sciences, and have often been pushed to a fallacious extreme in the Sensible sciences and Fine Arts, to the detriment of taste, assuming qualities to be quantities and quotities, and substituting mechanical correctness for grace and beauty, as they belong to general nature; while, in the most material, or pure physical sciences, they have been misapplied: as in giving figures to the elements, and subjecting chemical phenomena to accurate calculations upon supposititious data.

567. We have, however, already declared, that we object not to the Mathematics in themselves, but only to the mathematizing of all knowledge: for, although it has often happened that, by forcing the best things to false extremes, vice and error have ensued (and it has not fared otherwise with the Mathematics); yet it is no argument for the disuse of any instrument that it has been misemployed: all that reason requires here is to avoid the errors into which a zeal too common in the pursuits of mind would conduct us.

568. It has been this zeal which has given rise to the rival pretensions of the mathematical and experimental disciplines, wherein the claims of the Mathematics, in the arts of Fortification, Gunnery, &c., and those before noticed in Astronomy, Navigation, Magnetism, Geography, Optics, and all the

mixed sciences, must be admitted; while, on the other hand, we cannot but remark the contempt in which experimentalists and practical men, acting with natural reason and sagacity, have been held by mathematicians, as erst by their brethren of the Schools; nor overlook the paucity of discovery among the latter, and its frequency among the former; nor leave unregarded the mighty military achievements, great naval actions, important civil transactions, and many extraordinary discoveries and accomplishments of genius and ability in Physics, Chemistry, Electricity, &c., and the common arts of life, to all of which the Mathematics apply in some way; which yet are often achieved, not merely without their aid, but almost in despite of all disciplines and neglect of all rules.

569. So again, resuming the opposite view, we acknowledge the many admirable applications of mathematical knowledge in advancing and perfecting such arts and discoveries, and its various sublime investigations and profound analyses. Yet the adjustment of these claims is inexpedient to our design here, which is to mark the true relations and position of the Mathematics in the universal field of philosophy, and to exhibit their elementary outlines with the utmost briefness in a synoptical series of the sciences.

570. And if herein we have found it expedient to treat of the Mathematics as Disciplines and not as Sciences, both of which are the offspring of

universal philosophy, and to regard them as necessary instruments only of science, yet we have attached them to the first philosophy, or Ontology, to which they immediately belong, and thereby have given them the precedence of the Sciences, which take a middle, or Mesological station. We proceed, accordingly, to deliver briefly the first and chief general relations of the Mathematics, which lie as a foundation at the foot of their sciences and practice.

CHAPTER I.

MATHEMATICS.

571. PHILOSOPHY, in a universal view, comprehends the knowledge of powers, intelligences, and ends. Of powers, or principles, Ontology is the science; and it has three branches: of which, on the one extreme, is Metaphysics, or the science of conscious powers; on the other, Hypophysics, or the science of material elements: between which lie the *Mathematics*, or the science of concurring powers, the elements of quantity and measure.

572. It is remarkable, that, while the two extreme ontological branches afford no certain conviction or knowledge, the Mathematics, which lie between them, and of which they supply the conditions, are at once the most satisfactory and conclusive: the reason of which appears to be, that, while elements and essences are the necessary conditions of all things, they are primary and unconditional, conjectural and unknowable, in themselves, although they are efficient and evident in concurrence.

573. The ruling elementary powers, or principles — or the universal agent, patient, and efficient of the Mathematics — are *time, space,* and *motion:* if, by the term time, we rightly denote *the most general form of activity, or action;* by that of space, *the most general form of passivity, or passion;* and by that of motion, *concurrence of time and space, or action and passion or reaction:* for these are the sole elements of measure and quantity.

574. Simple, and definite, and easily conceivable, as are these relations of time, space, and motion; and free from doubt, as have ever been the ordinary understandings of men with regard to their signification, and to the things signified, there has been no subject throughout philosophy of greater abstruseness and difficulty than the abstract investigation of these principles, nor any subject which has led philosophers into more indeterminate, paradoxical, and confused speculations; in which there is, however, this coincidence of the Mathematics with the correlative, metaphysical, and hypophysical sciences,—that as essences and elements are the necessary conditions of all things, they can only be known in their *relations,* so are these essential conditions, time, space, and motion, the ultimate elements of all mathematics, correlative, but indemonstrable as *absolute* and independent.

575. Whatever exists, or can be known, is in Time. *Time,* therefore, is not resoluble into any

of the particulars of knowledge or existence, being no other than the most general relation of actions, or the form or mode in which effects succeed each other, and effects succeed each other only in *action.*

576. Time, then, denotes the relation of succession in action or effects, and is that in which the action, or existence of individual effects, is perceived with relation to each other and to the universal; and the infant mind first generalizes in its first conceptions of Time and Space.

577. Further, there are three genera of action and effects; consequently, there are *three modes of time:* first, the *external,* or time apparent, measured by the motions of astronomical bodies, and other external objects; secondly, the *internal,* or time arising with the actions or successive operations of the mind, or intellect; and, thirdly, the *medial,* or sensible time, in which the two former concur.

578. Time in the abstract, or pure time, has also three relations,—time *present,* time *past,* and *future* time; and of these every particular instant, or interval, partakes.

579. Thus time may not only be considered as *general,* but as *particular:* it may also be considered as *universal.* And this latter, also, has three relations:—first, as *eviternal,* without beginning; second, as *sempiternal,* without ending; and, third, as *eternal,* ever-being, or without either

beginning or ending;* and as such are attributes of God, the universal Being.

580. In like manner, *Space* is but the most general form, or mode of passive relation of things, by which they are expanded continuously in *length*, *breadth*, and *depth*; of which three relations every particle of space participates.

581. All things have external relation. Hence there is internal ubiety, as well as external space: by the former of which intellectual objects are said to be in external, or passive relation to each other.

582. Accordingly, we distribute ideas of a general, or universal nature, in external relation to each other, although they have no material objectivity; as we do, also, individual intelligences, or minds, and regard them as more or less capacious; while we attribute ubiquity, or omnipresence, to the Divine Mind, or Spirit: all of which could not be without a conception of *intellectual or subjective space*, or recipience, to the concurrence of which, with *external or objective space*, we owe, as a mean, the *sensible nature of perspective space*, or space according to common conception, as the universal recipient.

583. If it were otherwise, and space were a mere form of sense, we should still have the external, the internal, the medial, and all the relations of space intellectually, without objective or

* Figuratively and Substantively, *Eternity*.

subjective space; but, in truth, space may be regarded, like the whole of the mathematics, as pure, theoretical, speculative, abstract, and intellectual, — or as mixed, practical, real, concrete, and external, or sensible.

584. *Time and Space* are, therefore, nothing absolute, but are universal co-relations; and to hold or acknowledge any thing properly so called to be *out of* time and space, is but a contradiction in terms: for every thing has a recipient of, or inheres in, something, and to say that a thing is *out of* one recipient is to say it is *in* another. And what are *in and out*, but correlatives of position? that is, of time and space; and to argue the contrary hereof is to quibble.

585. Again: *Motion*, which partakes of both time and space, action and passion, has three relations: externally, and in common acceptation, all motion is physical and mechanical; medially, and as sensible, it is *emotion;* and internally it is *motive;* each of which has beginning, continuance, and ending.

586. The remarkable interunion and analogy that pervades the parts and wholes of the universal system, is a source of much ambiguity in the names and conceptions of things regarded as distinct, owing to a want of corresponding analogy in language, and is an occasion of infinite error when due discrimination is wanting. Hence the evil which has arisen in morals and science from the

unlimited application of the term *motion*, not only in the explanation of physical effects mechanically, but in a like explanation of the *emotions* of sense and the *motives* of mind, the relation and similitude of these terms giving them currency also for each other; and, in truth, we may lawfully term the first motion of matter, the second motion of sense, and the third motion of mind, when we carefully discriminate the literal signification of the first from the metaphorical, or figurative employment of the other two.

587. Thus, Time, Space, and Motion, the principles or *elements* of all mathematical discipline, and which we have defined the most general forms of Action, Passion, and Effect, are, we have seen, each triune: for Time cannot be conceived but as present, past, and future, — nor Space, without length, breadth, and depth, — nor Motion, without beginning, continuance, and ending; add to which, that they are each of three species with reference to the external, medial, and internal: so that triunity terminates nowhere but in the incomprehensible original of all principles, — the mean of all means, and the end of all purposes, — the Eternal, Eviternal, and Sempiternal — Omnipresent, Omnipotent, and Mathematically Perfect.

588. Thus the mathematical elements, like the physical and metaphysical, resolve into an *agent* and *patient*, cognoscible only in *effect*, and essentially triune; and as Action, Passion, and Effect,

are co-essential even in conception, so are Time, Space, and Motion: without the one, our notion of the others vanish; and we measure time by motion or effect in space, space by motion or effect in time, and motion by time and space. Hence the term *Metrics* (or the science of measure), which Plato applied to Geometry, is equally applicable to all Mathematics.

589. These principles concur in three ways: first, in *magnitude*, whence Geometry; secondly, in *multitude*, whence Arithmetic; and, thirdly, in *momentum*, or motion, whence Mechanics.

590. The modes of magnitude and space, or Geometry, are forms or *figures*; those of multitude and time, or Arithmetic, are *numbers*; and those of momentum, or Mechanics, are *motions*, powers, or forces.

591. Motions are of *external or material* relation; Number, of *internal or intellectual* relation; and Figures are of *medial or sensible* relation, or reference.

592. Of the elementary principles of mathematical science, Time, or the Agent, is principal in Arithmetic; as Space, or the Patient, is in Geometry; and Motion, or Concurrence of Action and Reaction, is in Mechanics; though each is essential to each.

593. We may in this view define *Arithmetic* to be the science of Times, Multitude, or Number; *Geometry*, to be the science of Space, Magnitude,

or Figure; and *Mechanics*, to be the science of Motion, Force, or Power. Nevertheless, each of the mathematical sciences involves both agent and patient, or time and space; for time is measured by space, and space by time,—and motion is the measure, and is measured by both of these.

594. The whole of the mathematical disciplines, like all disciplines, may be considered also in two views,—either as *pure or theoretical*, or as mixed, *practical, and applied;* or, according to their ordinary division, as *speculative or abstract*, and *mixed or concrete* mathematics.

595. They may otherwise be regarded in themselves intellectually, or sensibly, or materially; in which latter way Physics have been mathematized, by assuming Atoms and Monads to be Elements invested with generative mathematical powers. Thus the atoms of the Epicureans, according to Plutarch, had *figure*, extension or *succession*, and *weight* or *motion*.

596. Having already shewn how the Mathematics are distributable according to the universal relations of science, we need only repeat briefly, for the sake of order and connexion, that they have three branches: first, in internal relation, they have *Arithmetic;* secondly, in external relation, they have *Geometry;* and, thirdly, in medial relation, they have *Mechanics;* in which the two former concur.

597. Such are the correlative branches of

the *Mathematical Disciplines*, and they fall naturally, with little change of relation, into *series with the sciences*; for *Arithmetic*, being the most purely intellectual and theoretic of the three, lies nearest in relation to *Logical* science; while *Geometry*, partaking more of the sensible, conducts to *Mechanics*, which are principally of material and practical reference, and, approaching nearer in nature and relation to *Physics*, approximate naturally the first outline of our *Physiological series of the sciences*, which follows the Mathematics. We shall, therefore, proceed to treat of them in this order.

THE ANALOGY

OF

ARITHMETIC.

CHAPTER II.

ARITHMETIC.

598. ARITHMETIC, the first of the mathematical Disciplines, is the science of the relations of Multitude, times or number.

599. As the point in space is the element, or generator of all Figures, so is the *Unit*, once or one in time, or Monad in infinity, the element, generator, positive principle or agent, with *Zero*, cipher, totality, naught, negative, finitive, bounding principle, or patient of all integers, multitude, or *Numbers;* and these concurrent principles, the unit and the finite, are designated thus:

Unit, 1—Zero, 0.

600. The simplest *Numeration*, or notation of times or multitude, consists in adding unit to unit successively without bound, thus:

1 1 1 1 1 1 1 1 1, &c.

And such enumeration is *Linear*, having all its parts equal.

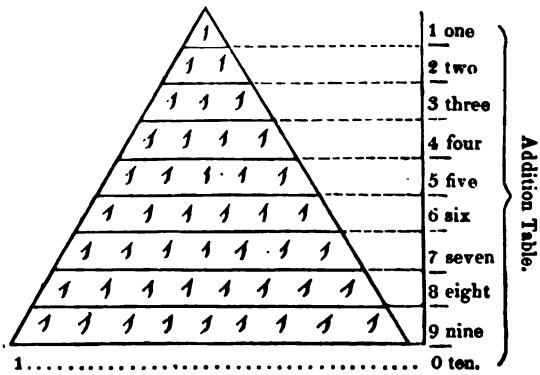
601. This is the natural arithmetic of children and the uninstructed, called *Scoring;* and such a series of twenty is called a *Score;* and these are a mode and expression still employed in the reckonings of our Peasantry.

602. Names and *Numerical Characters*, being given to designate the amount of units as they succeed each other in score, thus:

1 one 1,—11 two 2,—111 three 3,—1111 four 4, &c.,

a new series, and more comprehensive numeration, is obtained, which, increasing by equal additions of units from the unit point, and adding breadth to length, is *angular and superficial* thus:

Fig. 12. Table of Units.



603. Thus by regular combinations of *Units*, denoted by *notches* in Scoring, we arrive at the ordinary *Notation*, or series of numbers denominated *Figures*, — 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, —

which are the foundation of literary practical Arithmetic.

604. If, now, this series be terminated by *zero* in the place of the next integer or whole number, *ten*, designated by the extremes of the series 1-0, then by employing this 10 as a *new unit*, and proceeding as before, a *new series*, of still more comprehensive powers, is established, which, adding depth to breadth, produces a solid ratio of *tens*, thus:

10—20—30—40—50—60—70—80—90;

that is *one* ten; *two* tens, or twenty; *three* tens, or thirty; and so on according to the common, or *Decadic Arithmetic:* the zero, or 0, marking each decadic termination with its inclusive integers from the generating unit.

605. Again, by adding a second *zero*, a new *unit* is attained, whence, by a like solid progression of *tens of tens*, or hundreds, we arrive at another decadic point, or place of figures, including in its course the previous series of tens and units; and so on to other bounds or series—to *tens of hundreds*, or thousands — *tens of thousands* — *hundreds of thousands*, &c., to infinity; and they are severally designated thus:

10 — 100 — 1000 — 10,000 — 100,000, &c.,

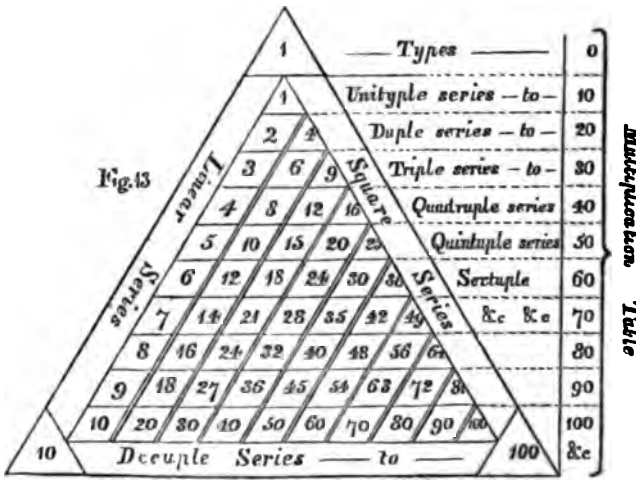
as every schoolboy knows.

606. As, by a simple addition of units in the foregoing table, we obtained the simple integers, so, by a compound addition of the simple series of integers, we acquire the compound integers of the following table; and, as multiplication is but a compound addition, this table has, under another form, been called the *Multiplication Table*, and ascribed to Pythagoras, who, wherever he obtained it, is said to have made it first known to the Greeks.

607. This table is constituted of several horizontal series, of which the various integers are the types, and it is bounded by a *series of integers* and a *decadic series*, the multiples of both which form a compound *series of square numbers*, constituting its third boundary, thus:

Table of Integers.

Fig. 13



608. This table is also the instrument of all arithmetical operations, including the four rules of Addition, Subtraction, Multiplication, and Division, comprehends many other remarkable properties, and may be extended to infinity.

609. Such is the simple foundation of the common or decadic arithmetic, as deduced from its types, the unit or monad, and the cipher or zero, in concurrence. But the zero, or boundary, might have been placed at any other integer than the decad, or ten, to produce other modes of numeration, arithmetic being by no means confined to the common or decadic series.

610. Accordingly, the boundary, or cipher, may be put after the unit in place of the *two*, to denote that integer; repeated to denote four; and again repeated to denote eight; and so on in duple or *Dyadic series* geometrically, comprehending the intermediate numbers by the agency of the unit, as in the previous mode of arithmetic; of which the following scale is an example, in which the equivalents of the various signatures are denoted by the common decadic numerals placed over them as tallies.

DECADIC EQUIVALENTS.

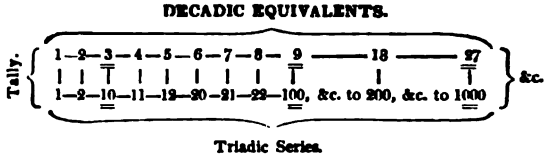
1—2—3—4—5—6—7—8—9—10—11—12—13—14—15—16 &c.
1—10—11—100—101—110—111—1000—1001—1010—1011—1100—1101—1110—1111—10000

Dyadic Series.

611. In this way we may proceed in a com-

pound arithmetical and geometrical progression by an additional 0, or cipher, at every new place of figures; and this is the simplest compound series of numbers, being only one remove from the series of units, or notches, called *scoring*.

612. In like manner may a triple, or *Triadic series*, be constituted, by putting the first *zero*, or finitive power, in place of the number *three*, the second at *nine*, the third at *twenty-seven*, and so on in compound triadic series, thus:



613. Arithmetic is, therefore, as capable of a *Dyadic*, *Triadic*, or *Tetradic* computation, as it is of a computation by tens or *Decads*; and as it is, also, of any greater or intermediate mode, of which our vulgar Dodecadic and Icosadic computation by *Dozens* and *Scores* are incomplete examples. And the greater the integer of any mode or series is, the greater is its comprehension and brevity of expression, but the more complex are its relations.

614. Each mode has peculiar powers and properties, advantages and disadvantages, in theory and practice; but the life of man is too short for the developement and full exercise of a few even of the numberless disciplines of which arithmetic alone is fruitful, and the decadic, decimal, or common

arithmetic, appears to be fully adequate to all the ordinary purposes of the art, being upon the whole the most perfect series, and comprehending all the others most simply and harmoniously by a *triad of triads*, bounded by the decad.

615. For the triad is the element of all multitude, as the triangle is of all magnitude, and it is the archetype not of geometrical figures alone, but of all natural forms, material, sensible, and intellectual. For instances of the truth of this position we refer to the perfect and infinite regimen of colours and sounds in particular, and to the indications of a like universal regulation throughout these Outlines.

616. For further elucidation of this analogy, we will briefly recapitulate, and then exhibit, some of the particulars, relations, and affections of numbers. It appears, then, that number is the effect or produce of the concurrence of a unity as agent with a totality as patient, and that these generating powers of numbers may be represented by any integer. Thus, in the decadic series, $\underline{1}$ is the sign of unity, and $\underline{0}$ is the sign of totality; but in the next place of figures, $\underline{10}$ becomes the sign of unity, and an additional $\underline{0}$, or $\underline{100}$, which tens the ten, is the sign of totality, and so to every place of figures. The same holds of $\underline{2}$, $\underline{3}$, $\underline{4}$, and all other integers.

617. By the simplest concurrence of these elements of integers, the *Monad*, unit, or $\underline{1}$, with

zero, or 0, is generated the *Duad*, or 2, which is the *first even number;* and thence proceeding in arithmetical progression, all other numbers are obtained.

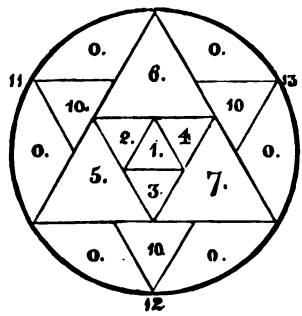
618. By the conjunction of the monad 1 with the duad 2, or first even number, is produced the triad 3, or *first odd linear number*, or perfect multitude, comprehending one, several, and all; and, by the concurrence of the triad is generated the *first square number*, or number multiplied into itself; and, finally, by the reagency of the zero are produced the series of *Solid numbers*.

619. And here, perhaps, if the simplest relations of numbers had prevailed, men had made 1, 2, 3, the agents, or integers, with zero, in the place of 4, of producing all other numbers; *Arithmetical series* and solid numbers would then have coincided with *Geometrical progression:* and this is a mode which has not been without example, since it appears to have been employed by the Thracians, as mentioned by Aristotle.

620. *Two*, *Three*, and *Four*, are, then, the primaries of number or multitude, whose secondaries are *Five*, composed of two and three; *Six*, composed of two and four; and *Seven*, composed of three and four; and here arises another boundary, whereat an *Ogdoadic arithmetic*, or series of eights, might be instituted in place and manner of the Decadic series of common arithmetic.

621. These first relations of number may be perspicuously represented in the following diagram:

Fig. 14.



in which, beginning at the centre, is the *unit* $\underline{1}$, and in its circumscribing triangles are *the primary integers*, first even, first odd, and first square numbers, $\underline{2}$, $\underline{3}$, and $\underline{4}$; and in their circumscribing triangles are the *secondary integers*, $\underline{5}$ composed of $2 + 3$; $\underline{6}$ composed of $2 + 4$; and $\underline{7}$ composed of $3 + 4$.

622. In this diagram the amount of the digits, taken diametrically from the angles of the large triangle, is in each instance ten, thus: $5 + 1 + 4 = \underline{\underline{10}}$, $6 + 1 + 3 = \underline{\underline{10}}$, and $7 + 1 + 2 = \underline{\underline{10}}$, or the bounding extreme of the decadic system, which may be continued to infinity by the efficacy of the zero 0,0,0, &c. Beyond zero, outside the circle, lie the Tertiary Integers, $\underline{\underline{11}} = 5 + 6$, $\underline{\underline{12}} = 5 + 7$, and $\underline{\underline{13}} = 6 + 7$, the elements of a second series, or decad, bounded in like manner by a second series, and so on. Fractional numbers

are but the same system inverted; for all numbers, integral and fractional, ascending and descending, are comprehended between unit and infinite; and it is upon the above analogy of numbers that Magic squares, &c., are constructed; like analogous diagrams of colours.

623. It is only necessary to compare this with the similar diagram of colours (Fig. 40), to perceive the exact conformity of relations in the analysis and synthesis of numbers and colours; without which comparison, parallels of things so apparently dissimilar might be mistaken for arbitrary inventions, or fantastic and mystical reveries.

624. Notwithstanding the high perfection, and many curious and admirable properties of the *Decadic arithmetic* universally employed, and its adequacy to the various purposes of computation, it is perhaps to be regretted that an *Ogdoadic series*, instead of the common or decadic, should not have been adopted practically in the common affairs of life, considering the facility of its use, and the simplicity of its structure — that it squares perfectly — comprehends both arithmetical and geometrical progression — and the simplest and most accordant ratios and proportions.

625. Hence, it affords the simplest and most uniform modes for the divisions of Weight, Length, Surface, and Capacity, and the best and most convenient ratios for the value of monies; add to which, that even numbers, and equal ratios, are

easiest in calculations and accompts of credit, &c., and that it coincides with the harmonic system of musical octaves, &c. Nor would it be less advantageous in application to other arts and sciences, owing to the easy comprehension of the relations of its remotest numbers and fractions, however extended, and the light of understanding accompanying all its details.

626. It is not, however, to the purpose of this Outline, that we should investigate the powers and properties of the various modes, nor even those of the decadic arithmetic already established; nor to speculate on new instruments and inventions, of which this art is infinitely fruitful; nor, finally, to enter any further into the field of arithmetical philosophy than regards the universal principles and first relations of number, to analogize the operations of arithmetic, and to indicate some of its coincidences with the sister sciences, and the forms of science in general. The subject itself is so well understood in its ordinary application, and the helps to the higher arithmetic are so numerous, and so acutely and admirably treated in a variety of celebrated works, while the subject is altogether so endless, that any attempt at detail here would be as misplaced as it is uncalled for.

627. Number in the abstract, like its coequal Time, in the abstract, is infinite or eternal; and it has, in this respect, the triple relation of time; for

first, it has present, or integral number — prior, or fractional number — and future, or sequent number — which are each correlative, coessential, and infinite.

628. To the relations of *more* and *less*, by synthesis or analysis, belong all the operations of arithmetic, and all calculating art; that is, to the *adding to* or *taking from* unity or number. Hence, the various modes of computation, or the Rules of Arithmetic, so called, are all reducible to *Addition* and *Subtraction; for Multiplication* is a compound Addition, and *Division* is a compound subtraction; and these are the four first rules of arithmetic, upon which all practice depends.

629. The *Rule of Three*, or Golden Rule, as it has been called, is a compound of the others, and is a true syllogistic process, in which the conclusion depends upon the premises, with a regular major, minor, and consequent; and it is direct or inverse, or analytic and synthetic: such are, also, all the higher processes of the art. And, as Division is but the converse or reverse operation of multiplication, as Subtraction is also of addition, the whole of arithmetic resolves into positing or affirming, and negating or denying, with logical accuracy and proof.

630. So much for Integral Arithmetic, from the unit to the infinite; but, as every whole is infinitely divisible, there is an inverse, or *Fractional*

Arithmetic, or arithmetic of parts, to which all the rules and reasons of the art apply; and of this there are two modes — the one called *Vulgar*, expressed thus, $\frac{1}{2}$ one half, $\frac{1}{3}$ one third, $\frac{1}{4}$ one fourth, and so on to infinity; the other called *Decimal*, the notation of which consists in a transposition of the common integral ciphers; the only difference in the signature, or mode of expression, consisting in the use of the zero, which, in whole numbers, is placed to the *right* of the digits, but in decimal fractions to the *left*, with the addition of a point prefixed, to distinguish fractions from integers; thus, $\underline{1.}$ is the same as $\frac{1}{10}$, — $\underline{.01}$, is $\frac{1}{100}$, — $\underline{.001}$, is $\frac{1}{1000}$, and so on to infinity.

631. All this is so well known, that the Mathematician, who may be unmindful that we are not addressing the man of science alone, may smile at the triteness of our explanations and our choice of terms, as he may also at the simple origin we have ascribed to this science — not from believing that sciences have so occurred from their elements, but from believing that they might so have occurred, that it is their natural mode of occurrence, and that they have somehow so occurred: notwithstanding, that which is first in nature is often of last occurrence in art or science, the perfection of which depends upon their ultimate analyses.

632. As to the actual source of the common Arithmetic, it has been ascribed, with great plausi-

bility, to the Hindoos; and it is exceedingly probable that these, and other early people, may have employed some of the other modes, which may have occasioned the enormous display of figures in their chronological and astronomical reckonings, so apparently extravagant and inconsistent with the decadic mode of computation, as has been most ingeniously conjectured;* for it is quite natural that men should have computed by pairs and leashes, as hunters still do, before they adopted tens. It is highly probable, therefore, that the decadic arithmetic was attained progressively, from the desire of men to abbreviate their computations; and that, by comparing the extravagant chronology of the Indians and others with some of these earlier modes, they may be reconciled with modern dates and computation.

633. As to the various arts and instruments which have been invented to facilitate and extend the operations of Arithmetic, such as are Algebra, Rhabdology or Logarithms, &c., to which we have before alluded, they are only modes of application among innumerable others of which these Disciplines are capable, and belong not to our subject any more than do the various ramifications and appliances of either of the modes; our object being accomplished if we have "taken up the

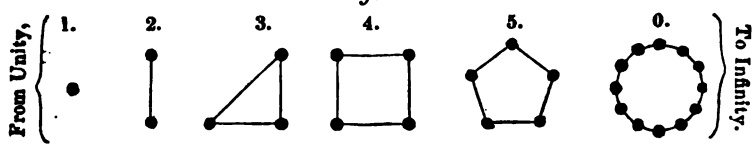
* Williamson's "Euclid," Vol. II., p. 367.

roots sound and entire," planted them in a right soil, and in a proper place.

634. It is apparent altogether that Arithmetic, by whatever series it be conducted — whether dyadic, triadic, decadic, or any intermediate or greater series, is a mode of discourse combining signs and propositions in a logical synthesis, rising from individuals to species, and from species to genera and universal, admirably illustrative of the office of reason in the summary of relations, purely exercent of that faculty, and affording the most perfect examples of logical inference; while it connects the Logical, Philological, and Mathematical disciplines.

635. The coincidences of this science with Geometry, or of number with figure, are most remarkable, of which we have already adduced several. Such are that of the *monad, or unit,* generative of all number, with the *Point* generative of all figure; and again, *two* connected points form a line; *three,* a triangle; *four,* a square; *five,* a pentagon; and so on arithmetically of all other polygons to *zero,* the circle, flowing point or infinite of number and figure, as thus represented:

Fig. 15.

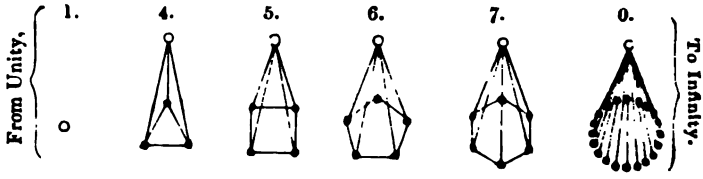


Or bounded only by another genus in the *Circle.*

And it is worthy of notice, that the forms, 3, 4, and 5, corresponding to the three first numbers of the antient mathematician, are the first and only regular plane figures that can contain a solid, or body. (See Fig. 29, &c.)

636. And as all *lines* consist of at least *two* extreme points, so all *surfaces* consist of at least *three* extreme points, and all *solids* of at least *four;* and by adding a new termination analogous to *zero* to each superficial figure, we get a new order of solid figures, in the manner of numbers, to infinity; thus:

Fig. 16.



Or bounded only by another species of figure in the *Cone*. Hence, numbers have been distinguished as linear, superficial, and solid, and otherwise distinguished by the names and relations of figures, through an analogy which is literally boundless.

637. Thus, the first *even number* corresponds with the first *linear figure* of *two points*, or extremes; the first *odd number*, with the *first superficies* of *three lines*, or extremes; and the first

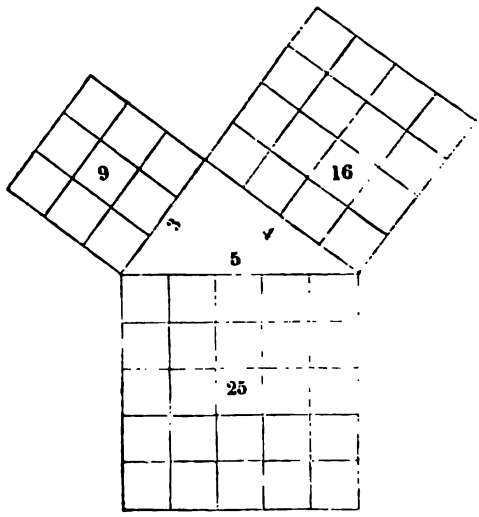
square number with the first *solid figure* of *four surfaces*, or extremes: and it was in accordance herewith that the antient mathematicians divided arithmetic into *solid*, *plane*, and *linear* numbers; each of which have, again, three species; first, the *integral*; secondly, the *fractional*; and thirdly, *radical*, proportional, or surds; each of which have similar and reciprocal relations.

638. The Greek mathematicians, who found all the relations of figure in numbers, speculated much among the analogies which lie at the root of these disciplines, about which the moderns give themselves comparatively little concern; for the moderns, having a notation very superior to the antient, and new instruments of vast powers, both mental and mechanical, for abbreviating, and infinitely extending, their operations; while the physical and mechanical applications of the mathematics, having opened a fruitful and boundless field of investigation, their speculations have taken other and opposite directions.

639. Nevertheless, science, in whatever way it be pursued, tends to the advantage of mankind; and it was in such speculations concerning the analogies of number and figure that Pythagoras discovered his celebrated and important theorem, preserved in the 47th Proposition of the First Book of Euclid, "that the square of the hypothenuse in a right-angled triangle is equal to the square of

the two other sides"—as represented to the eye numerically in the following diagram, upon the triangle 3, 4, 5.

Fig. 17.



Which affords an excellent example of the analogy of number and figure.

640. The *Nuptial Diagram of Plato* is this same triangle; and the late eminent Dr. Harrington, of Bath, has employed the same in demonstrating the universal indivisible triunity of the three primary simultaneous sounds of the *perfect musical triad,* in remarkable accordance with the Pythagorean and Platonic philosophies, which were framed upon harmonic principles; and the same analogy belongs to the harmonic triad of Colours, &c.

641. The numbers 3, 4, and 5, are, as we have shewn, analogous to the figures, following:

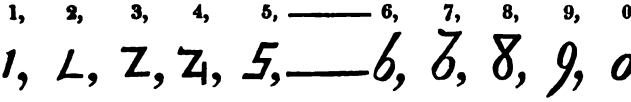
Fig. 18.

Which alone afford regular solids formed of equal planes, of which there are but three kinds, and five only possible, called Platonic bodies, namely, three comprehended in equilateral *triangles*, 4, 8, or 20; one in *Squares*, 6; and one in *Pentagons*, 12: and they are the *Tetrahedron*, the *Octahedron*, and *Icosihedron*; the *Hexahedron*, or cube, and the *Dodecahedron*. See Fig. 29, &c., and Euclid, Lib. XI., prop. XXI.

642. As to the arithmetical figures or *Digits*, which some have conjectured to be corrupt forms of Greek letters by Arabian writers, but which the Arabians confess to have obtained with the science itself from the Indians, we are inclined rather to attribute them to the corruption of original characters constituted of lines expressive of their numbers, thus:

Fig. 19.

1, 2, 3, 4, 5, —— 6, 7, 8, 9, 0.



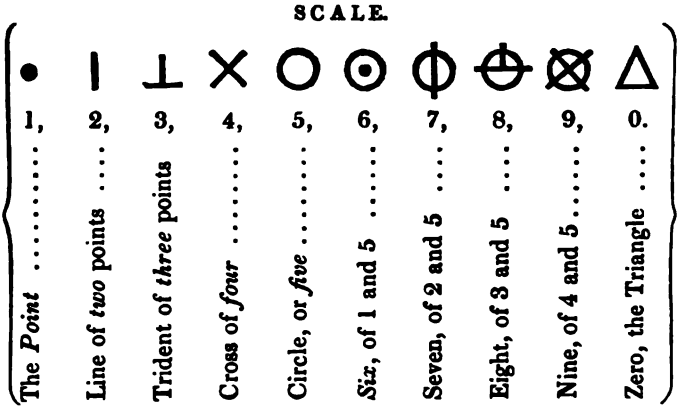
Each of the first five of this series of figures contains its exact number of lines; the remaining five characters are modifications thereof with the circle in a returning series from *zero*, or obtained or

adopted, perhaps, upon the successively extending of the series to the Decad.

643. Be these conjectures as they may, we were led by the same first forms of the line to a similar series, which we have employed the greater part of our life in literary notation, calculations, and on whatever occasion a distinct system of characters became of use. It is as follows:

Fig. 20.

SCALE.



644. The first four of these characters differ only in simplicity from those commonly employed in printing for literary reference * ‖ † ‡; but these latter wanting arithmetical relation, and having no reference beyond the page in which they are employed, are of very confined use; while it is evident the latter may be extended in numerical reference throughout a work, and without limitation: of which coincidence only by the by.

THE ANALOGY

OF

GEOMETRY.

CHAPTER III.

GEOMETRY.

SECTION I.

645. GEOMETRY, the second and intermediate of the mathematical disciplines, is the science of magnitude and Figure, or of the modes of space; although, according to its etymology, it originally denoted the measuring of the earth.

646. *Figure* has a triple reference,—to pure intellect, to matter, and to sense; the two first of which belong principally to Geometry, the latter to Plastics, which partake of the other two, and are the science of palpable or sensible figure, of which we have treated in a subsequent outline. Geometry is, accordingly, either *pure* or *applied:* the first regarding its elements, figures, and relations; the latter their applications in the sciences and arts.

647. Position and Magnitude, or the *Point* and *Space,* are the positive and negative,—agent and reagent,—concurring elements, or generating principles, of all geometrical shapes, forms, or figures.

648. The *Point* is sensible, or intellectual; of which the latter, or pure geometrical point, is *indivisible position*, or *position without magnitude:* the sensible point is *a minute space indicative of place or position.** And from the motion or fluence of a point in *Space*, which last is the infinite of geometry, are generated all *Figures.*

649. From the simplest concurrence or progress of a point in space springs *longitude or length;* from its *duple* progression in connexion comes *latitude or breadth;* and, by the *triple* progression and connexion of the point in space, is generated *profundity or depth*, whence *Lines, Surfaces, and Solids.*

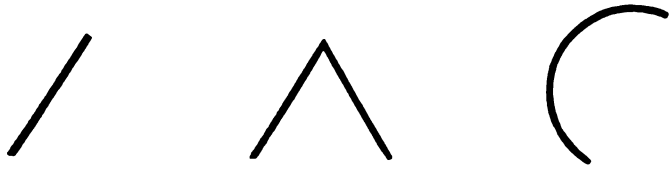
650. Thus the *line* is the fluent of a point, the *surface* is the fluent of a line, and the *solid* is the fluent of a surface; and these concur in the generation of all *Figures*, sensible and imaginary.

651. Fluence is either *direct, reflect,* or *inflect.* By the first, or simplest fluence of a point in space, is generated the *Right line;* by the second, or reflect motion, is generated the *Angular line;* as the *Curve, or circular line,* is by the third, or inflect motion of a point in space: and these are the three genera of lines, and the *primaries* of all

* Many other definitions of this element have been given, but none unexceptionable. To say "*the point is the end of a line,*" is no better than to say it is the *middle*, or *section* of a line, the extremity of an angle, the centre of a circle, or the apex of a cone, &c.

Figures, of which the second bounds more space than the first, and the third more than the second, as indicated by the following figures:

Fig. 21.



Line. Angle. Curve.

652. Each of these, again, has three varieties. Thus right lines are *perpendicular, oblique,* or *horizontal;* angles are *right, acute,* or *obtuse;* and curves are *arcal, spiral,* or *serpentine;* and these compound in the constituting of figures to infinity. The apparent incommensurability of the right line with the curve in all their varieties, from which the impossibility of the quadrature of the circle geometrically may be inferred, sufficiently distinguishes these elements; and the necessary concurrence of them both in the mensuration of the angle by the arc, specifically distinguishes the angle or reflex line from the direct and inflect.

SECTION II.

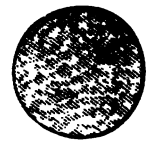
653. Again, the second mode of magnitude is the *surface or superficies,* which is generated by the

fluence, or lateral motion, of the line in space, and it has *two* dimensions,—length and breadth,—of which *one* only is appropriate to the line: it is also of three kinds corresponding with the varieties of the line; namely, Right, or plane, whence the *parallelogram*, &c.; Angular, whence the *triangle*, &c.; and Curved, whence the *circle*, &c.; and of these the following figures are examples:

Fig. 22.

Parallelogram.

Triangle.



Circle.

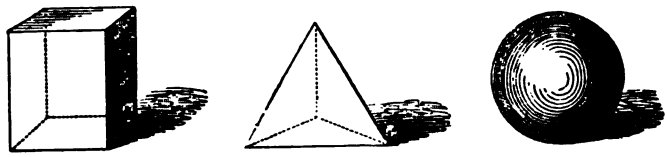
654. Each of these figures has also three species, or principal varieties: the parallelogram is *square, oblong,* and *rhombic;* the triangle is *equilateral, equicrural* or *isosceles,* and *scalenous;* and the circle is *right, elliptical,* and *hyperbolical.*

SECTION III.

655. Finally, the third mode of magnitude, or the geometrical solid, which is generated by the fluence, or superficial motion of a surface in space, and has *three* dimensions, *length, breadth,* and

depth, is also of three kinds analogous to those of lines and surfaces: first, the *Parallelopipedon;* secondly, the *Tetrahedron;* and, thirdly, the *Sphere*, represented in the following figures:

Fig. 23.



Parallelopipedon. Tetrahedron. Sphere.

656. And these, also, have each their species or principal varieties. Thus the Parallelopipedon is *cubic*, *plinthic*, and *oblong;* the Tetrahedron is *equiangular*, *obtuse*, or *acute;* and the Sphere is *right*, *oblate*, and *ovate;* and of these varieties there are innumerable degrees or intermedia.

657. Figures are also triply various, according to *line*, *surface*, or *solid*. Of these nine species all other figures are either varieties or compounds, as all possible figures are resoluble into the *three primary lines;* and these, again, are ultimately into the generating *point* and space.

658. Of all figures, the *sphere* is the most comprehensive; it is also the most perfect, complete, and uniform of all, in many respects resembling the point which generates all figures, as the sphere comprehends them all in its centre, diameter, radii, and circumference.

659. It is not, however, the purpose of this outline to treat of the properties of individual figures and numbers, but to disclose their primary and general relations; it is to an express mathematical treatise that it belongs to unfold a science and a world of wonders in every principal figure, and to institute the most admirable and beneficial practical applications thereof: but of such influence in this science are these elementary figures, that they have divided the whole of geometry into three coincident kinds, as *Plane*, *Trigonal*, and *Spherical*.

660. Nor need we enter into a wide investigation of that infinite diversity of compound figures of which these primaries are the elements. The simplest combinations of these afford the *Secondary figures*, by an intimate acquaintance with the properties and relations of which the most complex figures may be analyzed.

SECTION IV.

661. The secondary figures are, first, the *Prism*, composed of the Parallelogram and Triangle, or their analogous lines; secondly, the *Cylinder*, composed of the parallelogram and circle; and, thirdly, the *Cone*, composed of the triangle and circle: the first is linear and angular, the second linear and circular, and the third angular and circular, as appears in the following figures:

Fig. 24.

Prism. Cylinder. Cone.

662. Of all compound figures these are of greatest importance to the Mathematician, and have engaged a remarkable portion of his attention: witness, in particular, the doctrine of the *Conic sections*, and the various details of their individual properties with which works of Geometry abound.

663. *Conics* have, indeed, been treated as a distinct science, or branch of the mathematics, in which our regimen is remarkable, for they are founded on the three species of curves formed by the three various sections of a cone: first, the *Ellipsis* and *Oval*, produced by the plane section of a cone through both its sides; secondly, the *Parabola*, formed by a plane section parallel to one of its sides; and, thirdly, the *Hyperbola*, formed by a plane section not parallel to either side or base; as instanced in the following figures:

Fig. 25.

Ellipsis. Parabola. Hyperbola.

664. Each of these Curves has many peculiar properties of great importance in Astronomy and the higher Geometry. And *Prismatic* and *Cylindric sections* abound, also, with figurate analogies equally interesting to the philosopher and mathematician.

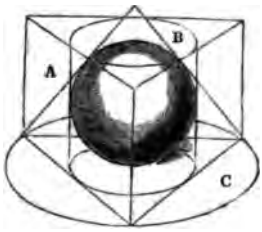
665. Of the analogous relations of the secondary figures, the most remarkable is that of their sesquialteral proportions with the Sphere, the chief, most perfect and uniform of the primary figures: and, first, of *the right Cylinder*, B, Fig. 26, *circumscribing a sphere*, of which Archimedes demonstrated the sesquialteral proportions, both in respect to superficies and solidity; secondly, of *the equilateral Cone*, C, Fig. 26, *encompassing a sphere*, demonstrated by Tacquet;* and, thirdly, of the like proportional analogy between *the triangular Prism*, A, Fig. 26, *circumscribing a sphere:* the same ratio holding in each case, both with regard to solid contents and superficies.

666. Thus the Sphere, the chief primary figure, becomes the standard of proportions to the three secondary figures, and the uniform measure of the whole. It was by the diagram of the Sphere, circumscribed by a Cylinder, that Cicero discovered in the ruins of Syracuse the tomb of Archimedes, upon which it had been inscribed, by his own desire, as that which, of his many discoveries, above all delighted him; and Father Tacquet has joined

* Tacquet's "Theor. of Archimedes," prop. xliv.

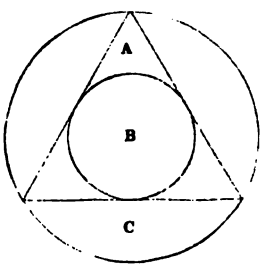
to the sphere and cylinder, in the same figure, that of a circumscribing Cone, and prefixed it to his "Theorems of Archimedes," with the allusive motto, "*Una tribus ratio est*," beneath it, which is even more applicable to the three secondary figures conjoined in common relation to the sphere, as in the following diagram:

Fig. 26.



667. A like consequent relation of these secondary figures and the sphere, is that the bases of a Cone, Prism, and Cylinder, severally and collectively circumscribing the same sphere, are precisely coinclusive; that of the cone C exactly inscribing that of the prism A, and that of the prism inscribing that of the cylinder B, as in the following figure:

Fig. 27.



SECTION V.

668. Many other remarkable coincidences of these three figures and their elements might be mentioned, none of which is in more striking agreement with our system, nor more wonderful in itself, than the mysterious analogy by which every figure virtually contains the elementary figures, as every number contains all numbers, every colour all colours, and every sound all sounds, &c., indigitating an essential identity of formal causes, the ordering of one ruling universal intelligence.

669. Thus the Cone is *linear* in its axis, &c., *angular* in its perpendicular sections, &c., and *circular* in its horizontal sections, &c.; and, doubtlessly, the many remarkable properties of the Conic sections result from this accordance of the primary figures in the cone. The same holds equally of the Sphere and other figures already instanced, and all figures coinscribe their own forms to evanescence: to all of which may be attributed the infinite fertility of Geometry, and the endless speculations and applications it affords to the Mathematician.

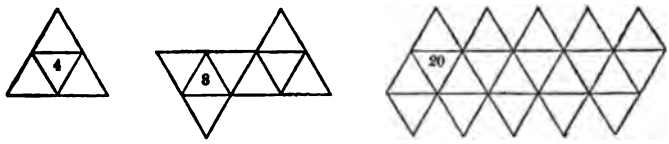
670. Again, of those celebrated solids called Platonic Bodies, which are formed of regular and equal Plane figures terminated by Right lines, of which it has been demonstrated that *three* only can contain a solid, and that, also, under the *three* species of angular figure, either as *Acute, Right,*

or *Obtuse*; namely, first under *equilateral triangles*; secondly, under *squares*; and, thirdly, under *pentagons*;

Fig. 28.

which three are the first and simplest plane figures, corresponding to the *three* first superficial numbers, and of such bodies or solids the equilateral triangle affords *three only*; namely, the *Tetrahedron* of 4, the *Octahedron* of 8, and the *Icosihedron* of 20, equilateral triangles, unfolded as follows:

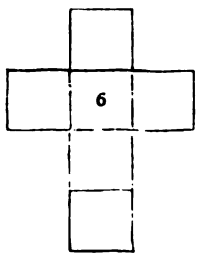
Fig. 29.



Tetrahedron. Octahedron. Icosihedron.

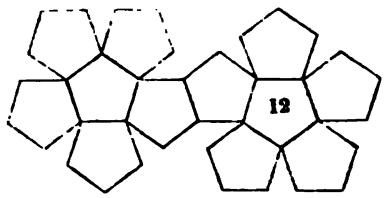
671. The two remaining plane figures, the square or right angled, and the pentagon or obtuse angled, can contain each only one regular solid; namely, for the first, the *Cube*, or *Hexahedron*, of six squares unfolded, thus:

Fig. 30.



And for the other, the *Dodecahedron* of twelve pentagons, as unfolded in the following figure:

Fig. 81.



672. As the first of these solids, the *Tetrahedron*, is the first and simplest extreme of solid angular figure, and the last, or *Dodecahedron*, is an approach toward the other extreme of solid figure the *Sphere*, the *Hexahedron* is intermediate to them; and as they are each resoluble into triangles, right, obtuse, or acute, it is evident that triangles afford the best metrical forms for all plane figures, surfaces, and solid bodies, &c., upon which depends the important science of Trigonometry, which abounds, also, with triadic arrangement. These figures are also the archetypes in nature of all floral forms as unfolded from their solid buds, as they are likewise of their capsules, and of innumerable other natural forms.

673. Yet, in a synoptical inquiry like the present, we must not permit the mind to range, however usefully or agreeably, amid the analogies of these disciplines, which crowd upon, and literally overwhelm, the mind, nor to dwell upon the

particular and infinite relations and properties of Figures; and enough has been done here to mark Geometry as a link of the universal series of science, intimately dependent upon, and altogether governed by, that analogy which regulates all things.

674. And as to the various instruments and disciplines which have been founded upon the properties of figures,—such as are Trigonometry and the arts of mensuration,—they appertain with innumerable others, known and unknown, of which this science is luxuriant, to the infinite field of the Geometrician, and belong no more to this outline than do the like branches of Arithmetic, and the other mathematical disciplines.

675. Ere we close the present chapter, however, it may be proper to remark, in connexion with our universal theory, that we hold geometrical figures to belong in general neither exclusively to the mind, as some speculative mathematicians have held, nor to external things according to the practical geometrician, but to be the effects of the concurrence of both these in sense; and that the primary line, angle, and curve, are to the general sense what notes and colours are to the eye and the ear.

676. But, notwithstanding we admit that geometrical forms, or figures, are perfect to us only in conception, or *intellectually*, it does not follow that perfect *material* figures are not possible or actual,

since matter has no first parts or elements occupying space, for atoms have neither demonstrable nor necessary reality; indeed, it is a just corollary, from the demonstration of mathematical incommensurable quantities, that elementary atoms have no existence at all: for if it may be justly deduced from the forty-seventh proposition of the first book of "Euclid" that *points cannot measure space*, then, by parity of reason, it is equally true that *atoms cannot constitute matter* occupying space.*

677. The imperfection lies, therefore, in *sense*, which cannot discern absolute perfection in figures any more than it can in colours or sounds, there being neither note nor colour discernible by the eye or ear that is absolutely perfect or unmixed; or that, if they were so, would be unaffected by the organ; nor any circle of art that has not innumerable deviations from correctness; nor any angle so acute, or perfect, as to be imperceptible; and the very perception of an angle proves its defectiveness, since it must in such case occupy sensible space, which proves its imperfection. We therefore drive the perfect figure out of sense, or the medium, into the mind and external, which are its concurrent principles.

678. It is worthy of remark, that the present science as regarded by the general mathematician, and as a science of ratio and measure, has several

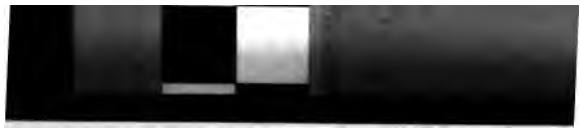
* See 775.

modes of demonstration, all of which resolve into an accurate logic. Thus the properties and proportions of figures may be ascertained or approximated by forces, or in other ways resolved mechanically. Hence, if figures be accurately formed of homogeneous substances, or such as are of uniform density, like the metals, their properties and relations may be reduced to number by weight or power; whence it appears that many of the problems of geometry may be resolved not only *geometrically* and *arithmetically*, but also *mechanically*; that is, by means of either of the three mathematical genera.

679. To conclude: it must be confessed somewhat remarkable that mathematicians, who have been distinguished above all learned inquirers by laborious assiduity, and devotedness to a science and discipline celebrated beyond all others for the solidity of its principles, the accuracy of its relations, and the certainty of its conclusions, should have dedicated their lives to the investigation of the properties of individual figures, and yet appear to have neglected the ground upon which their investigations rest; but whether such general, elementary, and preliminary knowledge as forms the basis of this outline, would not facilitate, enlighten, and extend geometrical studies and practice, we put to the determination of the learned mathematician? Should such knowledge, however, by withdrawing attention in any degree from par-

ticulars incline some to a contrary opinion, they must, nevertheless, admit, that to follow out the analogies of geometrical forms herein disclosed will afford endless, delightful mental recreation connected with geometrical studies, if it do not also lead to invention and discovery: they must also allow to these elements the power to expand the mind otherwise uninstructed in Geometry, to enlarge the bounds of ordinary inquiry, and to advance the great end of elevating the mind from the sensible to the intellectual station analogically.

680. But, although mathematicians may have omitted to investigate the ground of their particular disciplines, it must be acknowledged that the principle of such investigation is philosophical and not mathematical, and that the principles of every science are prior to, and out of, the bounds of the science itself.



THE ANALOGY

OF

MECHANICS.

CHAPTER IV.

MECHANICS.

681. *Mechanics*—Μηχανικὴ, from Μηχανὴ, machine, an Engine, or Invention — the third and last of the pure mathematical disciplines, are, according to our previous definition, *the science of motion;* or, according to Wallis, "*the Geometry of Motion;*" or even its *Arithmetic.*

682. The Mathematics universally are the science of *Powers,* of which *the powers of Arithmetic* are internal — that is, of intellectual relation, or the powers of numbers; the *powers of Geometry* are medial, or those of sensible forms or figures; and the *powers of Mechanics* are external or physical forces or *moving powers.*

683. Mechanics, in their widest acceptation, comprehend three specific branches; first, *Dynamics,* or the science of active or moving powers; secondly, *Statics,* or the science of passive, reactive, equilibral, regulative, or accumulative power; and thirdly, Particular *Mechanics,* or the science of effective, concurrent, or instrumental powers;

and each of these partakes of the others, and they are the foundations of many sciences, such as are Hydrodynamics, Hydrostatics, Physico-Mechanics, &c., which terminate in the Physical Sciences.

684. Of the three genera of Mechanics, regarded in its universal sense as the science of motion, Dynamics and Statics belong to *Theoretic Mechanics;* particular, or Instrumental Mechanics, being the general acceptation of the science, is principal in *Practical Mechanics;* its object is mechanical means, and it is medial in mechanical science, employs the other two genera, and is that to which the name Mechanics is currently applied; accordingly, *force* and *friction* are the efficient and concurrent causes of all mechanical effects—their agent and re-agent, or positive and negative powers.

685. All *motion,* dynamically considered, is the effect of action and passion, the most general or abstract forms of which are time and space. But in Mechanics the passive principle belongs to Statics, and is called re-action or *resistence,* to which belongs friction; and it is assumed, as a fundamental law of motion, that *action and re-action are equal and opposed.*

686. As Mechanics are of less simple reference than the other mathematical disciplines, its primary forms are less distinct, and more remote and compound, than those of Geometry and Arith-

metic, they are nevertheless sufficiently evident for the purpose of analogical arrangement.

687. For, as the *point* is the element or agent of geometrical figures, and the monad, or *unit*, is that of numbers, so is the fluent point, or *moment*, the agent or element of all motions, in like geometrical and arithmetical coincidence.

688. Motion is of three primary kinds, or genera: *direct*, or in a right line; *reflect*, or angular; and *inflect*, curved, or circular; and of these, all other motions are either varieties or compounds; in which respects the motions of Mechanics and the figures of Geometry are precisely conformable or coincident: hence figures also become mechanical powers, and motion is the generator of figures.

689. As direct motion, in coincidence with longitudinal figure, is either *linear*, *angular*, or *circular*, so reflex motion, coincidently with angular figure, is either in an *acute*, *right*, or *obtuse* angle, or direction; and so also inflected motion, coincidently with the curve, or circle, is *centripetal*, *centrifugal*, and *orbicular* or circular — *right*, *elliptical*, or *parabolical*, &c. And, with respect to angular motion, as action and reaction are equal, so *the angle of reaction, or reflection, in moving bodies, is always equal to the angle of action or incidence.*

690. So entirely are Mechanics a branch of the Mathematics, and so intimately are they correlated with Geometry and Arithmetic, that figures or forms may be executed mechanically, to which

the hand of man is inadequate; and arithmetical calculations may be computed, in like manner, with a certainty, and to an extent unattainable by the mind of man. So mechanical, indeed, is the whole of the Mathematics, that their famed certainty and perfection rather lowers than exalts them in the rank of science; if, indeed, we can truly ascribe any other dignity to science than that which belongs to its end, which is truth; and, in truth, reason and mechanism are identified.

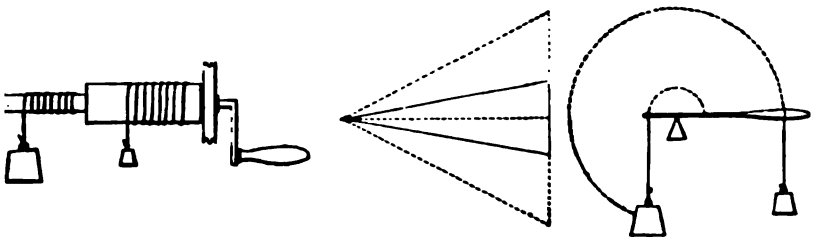
691. Force or power has degrees, or quantity, which is called *momentum*, being constituted of moments; and this, as modified by time and space, is called *velocity;* upon which relations of motion is founded the maxim, that *what is gained in power mechanically is lost in time;* which is the same as to say, *what is gained in momentum is lost in velocity*—that is, in time and space; for in these all motion is commenced and propagated; and, vice versâ, *what is gained by a machine in velocity is lost or expended in momentum.*

692. As action and reaction are equal and opposed powers, it follows that every *body in motion tends to that place where there is least resistance* or reaction; or, in other words, active power is proportionably greater where it meets with least passive power, or reaction, or resistance. By this universal law we may account for all the variations and phenomena of mechanical motions, whether they be dynamical, statical, or mechanical, or of

solids, liquids, or elastics, or of either of these latter moving in the others.

693. The *primary* instruments, or machines, called *Mechanical powers*, as distinguished from Dynamical, or moving powers, and by which motion is modified, coincide also with the primaries of figure. Thus, with regard to forms, the *Pivot*, or centre, corresponds to the Point; the *Axis*, or axle, to the Line; the *Wedge*, to the Angle; and the *Wheel, or Lever*, to the Curve, or Circle; thus:

Fig. 32.



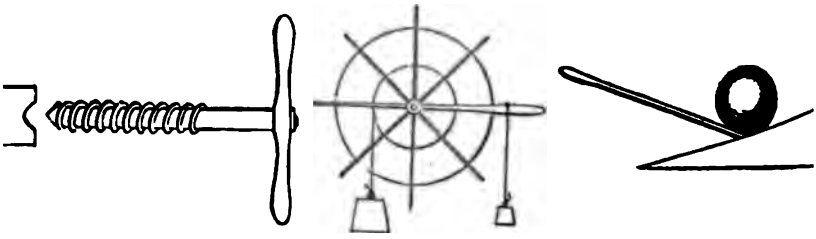
Axle. Wedge. Lever.

694. And of these *movements*, all other instrumental mechanical powers are either varieties, secondaries, or compounds. And, with regard to their motions, the *Pivot*, which is the first elementary mechanical power, moves upon a point, or centre; the *Axle*, which may be regarded as a linear, or long pivot, acts upon a line; the *Wedge*, upon an angle; and the *Lever*, in a curve, arc, or circle.

695. Of these, the *secondary movements*, or mechanical powers, are the *Screw*, which is a

compound of the Axis and Wedge; the *Wheel*, which is a compound of the Axle and Lever; and the *Inclined Plane*, composed of the Wedge and Lever; all of which are identified in each.

Fig. 33.



Screw. Wheel. Inclined Plane.

696. Further, *Pulleys* are compound wheels, and *Balances* are compound levers. To these may be added the *Fly*, the *Pendulum*, and whatever may become a reserving, accumulating, or regulating power; and also the *Spring* and *Weight*, and whatever may become instrumental as a moving or impelling power — although these latter are compound dynamical and mechanical powers. And thus may the instrumental powers of mechanics be multiplied and compounded indefinitely.

697. These original instruments or machines have each their varieties; and even the *point, pivot, or centre*, the generator of mechanical forms, participates their relations, and has three distinctions; dynamical, as the *centre of force, or motion*; statical, as the *centre of gravity;* and geometrical, or mechanical, as the *centre of magnitude;* upon a

due regard to, and right adjustment of, which three centres depend much of the skill of the Mechanist, and their coinciding conduces to the perfection of compound machines.

698. The mechanical powers, so called, neither supply nor add to the physical force or momentum of machines. They have power only to modify motion by accumulation and distribution of *force*, and this they accomplish with loss by *friction*, which is its antagonist, and is augmented by weight, complexity and dispersion of parts, and imperfection of execution in the construction of machines.

699. Hence the impossibility of *self-moving and perpetual motion* by machinery, and the vanity of seeking them; a delusion to which, nevertheless, we owe many valuable inventions, and into which ardent minds have been misled by the term *mechanical powers*, employed to denote the simplest forms of machines. Hence, also, the advantages of simplicity in machinery, and its connexion with beauty in mechanic art.

700. *Friction* is either mathematical or physical — that is, geometrical or dynamical; or, in other words, mechanical or chemical. *Mechanical friction* arises from the power of bodies, moving in contact in different directions, to penetrate each other, whence resistance ensues, and motion is retarded, or lost; and as this power to penetrate depends, mechanically, upon the force of impres-

sion between bearing surfaces, it is evident that, by whatever this impression is reduced in colliding surfaces, friction will be proportionably reduced, and motion facilitated.

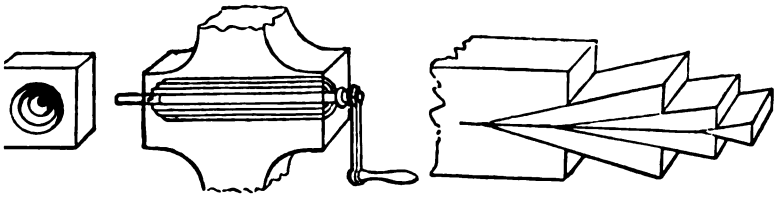
701. This is accomplished in two ways *mechanically;* by polishing or reducing the penetrating points of substances countermoving in contact—and by extending the bearings of the moving surfaces, which proportionably reduces the force of impression: and this meets both cases of the power of penetration, upon which friction depends.

702. We will not here offer examples, nor consider this subject *physically*, but briefly apply the principle to the primary movements, or mechanical powers, in a universal practical mode, applicable to all machinery: First, to the *Point, or Pivot*, the friction of which lies in the cup, or socket, in which it moves; let, therefore, this socket work in a second cup, or socket, to which the motion will be partly transferred, the moving surface increased, and the friction reduced; let this second cup move in a third with similar effect, and so on, reducing friction *ad infinitum*.

703. Again: to the *Line, or Axle*, the friction of which lies in the box in which it turns, let this box turn in a second box, or collar, and so on to the like end; and finally, let the *Angle, or Wedge*, be similarly multiplied, and penetrate each other with similar result; and as these cases comprehend *Curvilinear movements*, in which wheels and pulleys

are compounded, they illustrate a principle applicable to all the forms of movement in which friction can occur. The above primary instances may be exemplified by the figured sections following:

Fig. 34.



ompound Pivot. Compound Axle. Compound Wedge.

704. *Chemically, friction* arises from the affinities of colliding substances to enter into combination; hence, friction is reduced by interposing, between the colliding surfaces of machines, substances of a proper texture, which have little or no chemical affinity with the substances of the machines themselves; such are oils and fat bodies, plumbago, soaps, soft earths, amalgams, and neutrals of powerful component affinities.

705. By the various combinations of the above primary and secondary engines is produced all the variety of compound machinery by which motion is modified, in the production of mechanical effects; and this they accomplish by so accumulating, adjusting, and measuring out the impelling, moving, potential, or active and dynamic power, with the regulating, resisting, or passive and static power,

that velocity and momentum become so controlled as to produce the degrees and kinds of action required between the extremes of motion and rest; the sole office of machinery being to modify power by accumulation, distribution, and regulation.

706. Hence, in every well-contrived machine there are provided both an *impelling* and a *regulating* power, by which motion may relatively be increased or diminished; and there are only three things by which these can be determined, namely, *magnitude, density, and figure.*

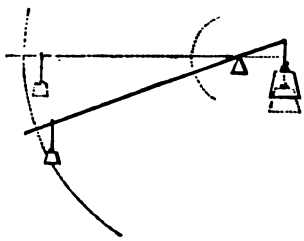
707. It is the active office of mechanics to *accumulate* force, or moving power, and this it can only do *successively,* in which, according to the before-mentioned maxim, *what is gained in power, or momentum, is lost in time, or velocity.* The vast *power of Percussion* is the result of such accumulation, discharging in an instant, or point of time, the force accumulated by successive or continuous efforts; hence, also, the *force of acceleration* in falling bodies.

708. To the passive or reactive office of Mechanics it belongs to reserve and regulate, or *distribute* power; and this it does *continuously:* whence, consequently, the antagonist maxim arises, that *what is lost or expended in power is gained in space;* or, which is the same, what is lost in velocity is gained or reserved in momentum. Its principle is that of *rest,* as the other is that of *motion,* and they are both forces; the one pas-

sive — the other active; the first statical — the latter dynamical.

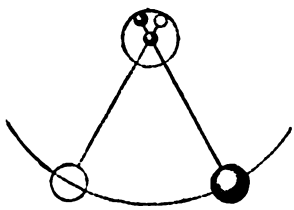
709. Of the power, or principle of *accumulation*, the lever is the simplest and sufficient example; for to this all the other mechanical powers, so called, may be reduced: *e. g.*

Fig. 35.



And of the opposite power of *distribution* or regulation, it affords a like example in the Pendulum: *e.g.*

Fig. 36.



Of the first, we have more complex examples in Pulleys and the Pile Engine, &c., and of the latter in a variety of Chronometers.

710. To the original geometrical forms of motion may be also referred the simple instruments or tools of the Mechanic; among which may be enumerated, as instances, the *Piercer*, Pivot, or

Point, for penetrating; the *Axe*, Edge, Wedge, or *Line*, for dividing; the Saw, File, *Plane*, &c., or *Surface*, for facing, cutting, and grinding; and the Hammer, &c., or *Solid*, for percussing and pounding.

711. Of these, too, the punctum, or *point*, is the geometrical element; the edge being *a line of points*; the saw, plane, and file, &c., *surfaces of edges and points*; and the Hammer, &c. a *solid* combination of surfaces, lines, and points.

712. The simple tools of the mechanic are also variously compounded and mechanically formed in the construction of other tools, instruments, and operative engines: thus, Plyers, Pincers, Sheers, and Scissors, are compound Levers, with wedges or edges for cutting, teeth or points for compressing and holding, &c.; and Stocks and Centres, Drills and Lathes, &c., comprise the axis, wheel, and all the mechanical powers.

713. Mechanics, however, like their sister sciences, Geometry and Arithmetic, are an infinite discipline, of which it is our main object to indicate the simplest and most general relations; and it would be an endless task to enumerate, and much more so to analyze, the tools of the artizan and mechanist; among which, as a final coincidence, *Circulating* or revolving tools, or *Lathes*, &c., are pre-eminent.

714. It is a fact in Operative Mechanics, that a short axle or arm is turned with proportionably

greater difficulty than a long one; consequently, *by lengthening an axle, shaft, or haft, some power or force is gained.* This is, nevertheless, a fact which is inexplicable, upon the common principle of mechanic forms, or that of the lever, by which all the mechanic powers are explained. It may, however, be accounted for upon *the principle of accumulation,* by which what is gained in power is lost in time; and depends upon the elasticity of materials, the *long arm* acting as a *spring,* but less immediately than the short one; and, in all the forms of the Spring, it accumulates, reserves, and defers power, which entitles it to rank among the passive modifying powers of Mechanics. It is a fact, also, that a long axle has less friction than a short one; and this depends upon *distribution.*

715. The intelligent mechanic knows that *action, reaction, and effect, are coequal and coessential;* or at least admits, that what is gained in power is lost in time; and that, consequently, *the effects of all machinery resolve into labour or power* ultimately. Machinery, however, accumulates, modifies, regulates, distributes, and economises power; but while, in so doing, it produces *more goods* than the same quantity of power applied by hand, it demands more materials, and thereby ultimately rewards more labourers. The arts of the Miner, the Smelter, the Founder, the Smith, &c.; the Husbandman, the Forester, the Carpenter, the Mason, and innumerable others, are pre-essential to the

art of the Mechanist, which affects individual advantage through the general good.

716. How infinite are the arts and manufactures, that are subsequent to and dependent on Mechanics! Of which we need mention only two classes; they are those of the Steam-Engine and of the Loom; whence boundless occupation and rewards for Labourers, and a thousand goods otherwise unattainable to society.

717. By an opposite process, *Division of Labour*, so effective and economical in manufacturing, is entirely resolvable into the mechanical principle of saving time, by diminishing space and loss of power, and increasing *a particular power* at the expense of *the general powers*, whether of muscle, faculty, or function, and this it does though the nature, discipline, and habit, of the individual labourer, concurrent to a general purpose.

718. It is by a union of the mechanical and manual processes that arts and manufactures are carried to perfection. With the individual, however, these produce but individually; while, combined and generalized, they produce in a multiplicate ratio geometrically.

719. It is, therefore, from a narrow and partial view, that men are led to condemn the powerful, enlightened, and beneficial aids of machinery, properly directed; which avails itself of all natural powers for the advantage of man; and, while it economises his physical force, gives vast scope to

his intellectual and moral powers for mutual support and preservation, and the general good.

720. Of the three great branches of the Mathematics, it might be difficult to determine which is most important to mankind, since they are each indispensable and coessential; but of their reciprocal coincidences and intimate connexion, and their accordance with the universal relations of science, being all that was requisite to our present design, we have sufficient evidence in the preceding view, notwithstanding the brevity and imperfection of our sketch.

721. And as it belongs not to this design to treat of the various powers of motions, figures, and numbers, which are the proper objects of their respective sciences, considered, not as related and dependent, but as distinct, principal, and practical, we may terminate the present Outline, remarking only by the way, in evidence of the reciprocality of these sciences and their objects, that as magnitude, and its forms or figures, refer principally *to space and the external,* as a passive extreme, so motion relates more particularly to *time and the internal,* as the active extreme; whence velocity or quickness in *motion* is opposed to quantity or largeness in *magnitude;* while *multitude,* or number, is the *medium, or measure of both.*

722. Of the two extreme sciences appropriate to this Outline, as the first, or *Arithmetic,* springs

immediately from the discipline of *Logic*, and is the most logical or intellectual, so the last, or *Mechanics*, being more material or physical, is in more intimate relation with the *Physiological Sciences*, which constitute the third part of our work; and with *Physics*, the first of them, in particular, which follows next in the natural series of science, and to which we in the next place proceed.

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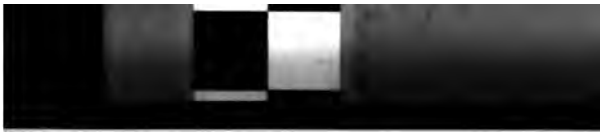

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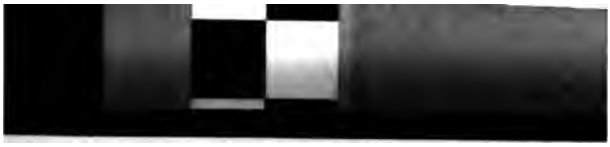

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